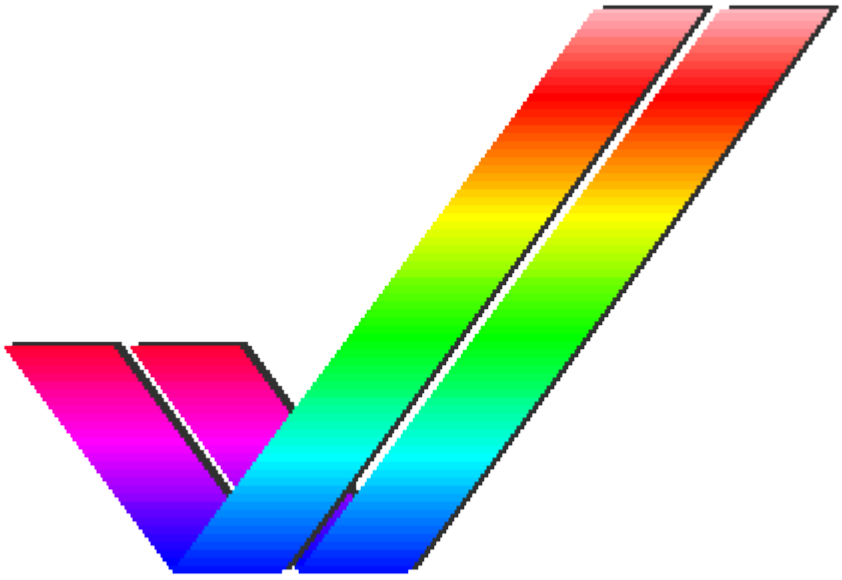
A history of the Amiga

By Jeremy Reimer



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AMIGA

A history of the Amiga, part 1: Genesis

By Jeremy Reimer

Prologue: the last day

April 24, 1994 The flag was flying at half-mast when Dave Haynie drove up to the headquarters of Commodore International for what would be the last time. Dave had worked for Commodore at its West Chester, Pennsylvania, headquarters for eleven years as a hardware engineer. His job was to work on advanced products, like the revolutionary AAA chipset that would have again made the Amiga computer the fastest and most powerful multimedia machine available. But AAA, like most of the projects underway at Commodore, had been canceled in a series of cost-cutting measures, the most recent of which had reduced the staff of over one thousand people at the factory to less than thirty.

"Bringing your camera on the last day, eh Dave?" the receptionist asked in a resigned voice."Yeah, well, they can't yell at me for spreading secrets any more, can they?" he replied.

Dave took his camera on a tour of the factory, his low voice echoing through the empty hallways. "I just thought about it this morning," he said, referring to his idea to film the last moments of the company for which he had given so much of his life. "I didn't plan this."

The air conditioners droned loudly as he passed warehouse after warehouse. Two years ago these giant rooms had been filled with products. Commodore had sold $1 billion worth of computers and computer accessories that year. Today, the warehouses stood completely empty.

Dave walked upstairs and continued the tour. "This is where the chip guys worked" he said as the camera panned over empty desks. The "chip guys" were engineers designing VLSI (Very Large Scale Integration) custom microchips on advanced CAD workstations. These chips had always formed the heart of the Amiga computer. Five years later, most personal computers would include custom chips to speed up the delivery of graphics, sound, and video, but the Amiga had done so since its introduction in 1985.

"Wow, one guy is still here!" Dave said, zooming in on the workstation of Brian Rosier. "And he's actually working!" The workstation screen showed a complex line graph, the result of a simulation of a new chip design. "This is for my next job," the engineer said, smiling. Most of the technical people would not be out of work for very long.

Dave passed his own office. The camera zoomed up to an empty bottle of ale displayed proudly on a shelf. "This was for the birth of my son," he said, then panned around the rest of the desk, filled with papers and technical manuals. "I felt I had to do something," he said before he left.

"This was my workbench," he explained as the tour continued. On the desk were various Amiga computers, a Macintosh IIsi, tons of test equipment, and a large prototype circuit board.

"And this... this is Triple-A," he said, with a mixture of pride and bitterness. "I read on the 'Net that AAA didn't exist. Well, here it is!" He pointed out the memory slots, the expansion bus, and various other features.

Many of the Commodore engineers were on the Internet, back before the World Wide Web existed, when the 'Net was just text and was the exclusive domain of academics, researchers, and a few dedicated hobbyists.

AAA had been the subject of hundreds of rumors, from its announcement to a series of delays and its final cancellation. While there were those who believed it had never existed, there were also others who went the other way, who endowed AAA with mythical properties, perpetually waiting in the wings for its revival and subsequent domination of the computer industry.

These people would keep the faith for years, in the subsequent trying times for the Amiga after the death of its parent company. They refused to let go of the dream.
Others were more pragmatic. "Here's Dr. Mo!" Dave exclaimed, finding Greg Berlin, manager of high-end systems at Commodore International, crouched down on the floor, pulling chips out of a personal computer and placing them, one at a time, on top of the large tower case.

"Dr. Mo in pilfer mode," he said, looking up from his task. His face registered laughter, guilt, sadness, and resignation all at the same time.

He sighed. "Well, I've been waiting all these years, I finally broke down and I'm doing it. I finally decided, I've been here long enough that I deserved something." He looked at the tiny, pathetic little pile, as if the supreme inequity of this trade was suddenly hitting him. "So I'm taking a couple of RAM chips," he said.

Introduction

The Amiga computer was a dream given form: an inexpensive, fast, flexible multimedia computer that could do virtually anything. It handled graphics, sound, and video as easily as other computers of its time manipulated plain text. It was easily ten years ahead of its time. It was everything its designers imagined it could be, except for one crucial problem: the world was essentially unaware of its existence.

With personal computers now playing such a prominent role in modern society, it's surprising to discover that a machine with most of the features of modern PCs actually first came to light back in 1985. Almost without exception, the people who bought and used Amigas became diehard fans.

Many of these people would later look back fondly on their Amiga days and lament the loss of the platform. Some would even state categorically that despite all the speed and power of modern PCs, the new machines have yet to capture the fun and the spirit of their Amiga predecessors.

A few still use their Amigas, long after the equivalent mainstream personal computers of the same vintage have been relegated to the recycling bin. Amiga users, far more than any other group, were and are extremely passionate about their platform.

So if the Amiga was so great, why did so few people hear about it? The world has plenty of books about the IBM PC and its numerous clones, and even a large library about Apple Computer and the Macintosh platform.

There are many also many books and documentaries about the early days of the personal computing industry. A few well-known examples are the excellent book Accidental Empires (which became a PBS documentary called Triumph of the Nerds) and the seminal work Fire in the Valley (which became a TV movie on HBO entitled Pirates of Silicon Valley.)

These works tell an exciting tale about the early days of personal computing, and show us characters such as Bill Gates and Steve Jobs battling each other while they were still struggling to establish their new industry and be taken seriously by the rest of the world. They do a great job telling the story of Microsoft, IBM, and Apple, and other companies that did not survive as they did. But they mention Commodore and the Amiga rarely and in passing, if at all. Why?

When I first went looking for the corresponding story of the Amiga computer, I came up empty-handed. An exhaustive search for Amiga books came up with only a handful of old technical manuals, software how-to guides, and programming references. I couldn't believe it. Was the story so uninteresting? Was the Amiga really just a footnote in computing history, contributing nothing new and different from the other platforms?

As I began researching, I discovered the answer, and it surprised me even more than the existence of the computer itself. The story of Commodore and the Amiga was, by far, even more interesting than that of Apple or Microsoft. It is a tale of vision, of technical brilliance, dedication, and camaraderie. It is also a tale of deceit, of treachery, and of betrayal. It is a tale that has largely remained untold.

This series of articles attempts to explain what the Amiga was, what it meant to its designers and users, and why, despite its relative obscurity and early demise, it mattered so much to the computer industry. It follows some of the people whose lives were changed by their contact with the Amiga and shows what they are doing today. Finally, it looks at the small but dedicated group of people who have done what many thought was impossible and developed a new Amiga computer and operating system, ten years after the bankruptcy of Commodore. Long after most people had given up the Amiga for dead, these people have given their time, expertise and money in pursuit of this goal.

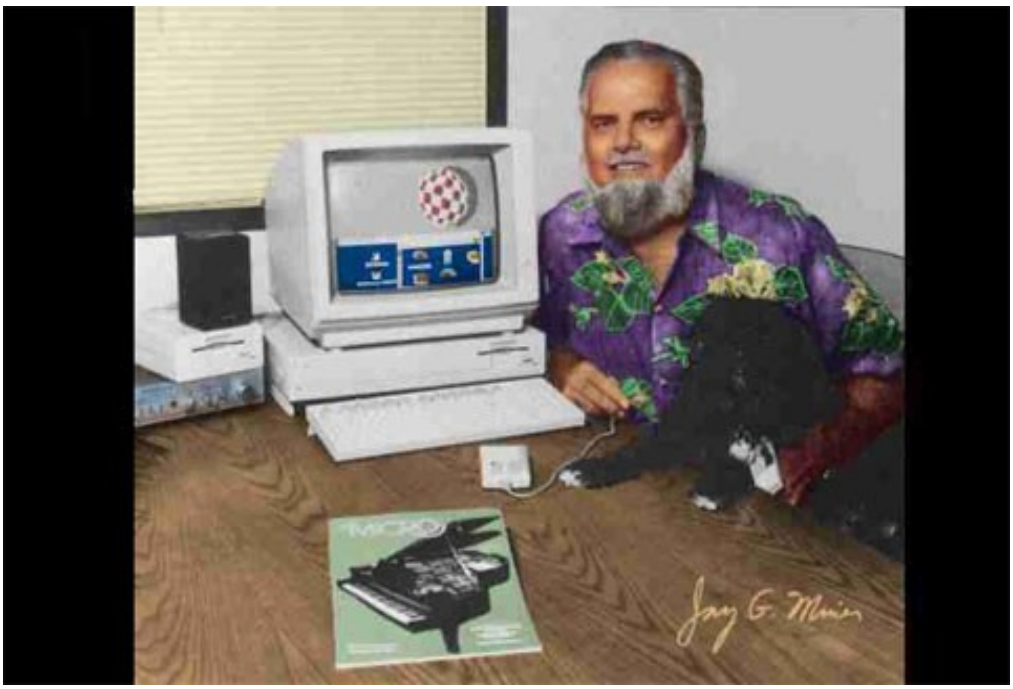
To many people, these efforts seem futile, even foolish. But to those who understand, who were there and lived through the Amiga at the height of its powers, they do not seem foolish at all.

But the story is about something else as well. More than a tale about a computer maker, this is the story about the age-old battle between mediocrity and excellence, the struggle between merely existing and trying to go beyond expectations.

At many points in the story, the struggle is manifested by two sides: the hard-working, idealistic engineers driven to the bursting point and beyond to create something new and wonderful, and the incompetent and often avaricious managers and executives who end up destroying that dream.

But the story goes beyond that. At its core, it is about people, not just the designers and programmers, but the users and enthusiasts, everyone whose lives were touched by the Amiga. And it is about me, because I count myself among those people, despite being over a decade too late to the party.
All these people have one thing in common. They understand the power of the dream.

The dream (1977-1984)



Jay Miner and his dog, Mitchy

There were many people who helped to create the Amiga, but the dream itself was the creation of one man, known as the father of the Amiga. His name was Jay Miner.

Jay was born in Prescott, Arizona on May 31, 1932. A child of the Depression, he was interested in electronics from an early age. He started university at San Diego State. By this time, the Korean War was in full swing, and Jay opted to join the Coast Guard. His education and interest worked in his favor, landing him in electronics school in Groton, Connecticut. It was here that he met his future wife, Caroline Poplawski. They were married in a quiet ceremony in 1952.

Jay's interest in electronics continued to grow, and he brought his new bride with him to California where he enrolled at the University of California-Berkeley. He completed his degree in electrical engineering in 1958.
Berkeley would later become a hotbed of computer science, contributing, among other things, the TCP/IP communications protocol that would later become the standard for the entire Internet.

For the next ten years, Jay moved around from company to company, many of them startups. His desire to be involved at a fundamental level in the design process was far greater than his need for steady employment. At startups, all the traditional rules about management and procedure are typically thrown out the window. People don't worry about sticking to their job descriptions; employees on every level from intern to CEO simply do whatever work needs to be done. This type of environment suited Jay well.

Jay then landed a position at a hot young company called Atari, which had gone from nothing to worldwide success overnight with the invention of the first computerized arcade games, including the blockbuster PONG.

Atari was by no means a typical company. Its founder, Nolan Bushnell, was a child of the 1960s and believed that corporations could be more than emotionless profit machines: they should be like families, helping each other to prosper in more ways than just financially. There were few rules at Atari, and it didn't matter how weird a person you were if you could do the work. (One such Atari hire was Steve Jobs, who later moved on to bigger and better things).

The man at Atari who hired Jay Miner in the mid-1970s was Harold Lee, who became a lifelong colleague and friend. Harold once said of Jay that "he was always designing. He never stopped designing." That kind of attitude could get you far at a company like Atari. Jay wound up being the lead chip designer for a revolutionary product that would create a multibillion dollar industry: the Atari 2600, otherwise known as the Video Computer System or VCS.

Atari days

The generation of gamers who have been raised on Sony and Nintendo may not remember Atari, which today exists only as a logo and a brand used by a video game software company, but Atari essentially created the home video game industry as it stands today.

The VCS was the first massively popular game console, and despite having incredibly primitive hardware inside, it managed to have a commercial life span far greater than any of its competitors.

The Atari 2600 and the game that made it famous

Much of this longevity was due to Jay Miner's brilliant design, which allowed third-party programmers to coax the underpowered machine to achieve things never dreamed of by its creators.

An example of this was Atari's Chess game. The original packaging for the VCS showed a screenshot of the machine playing chess, although its designers knew that there was no way it was powerful enough to do so. However, when someone sued Atari for misleading advertising, the programmers at Atari realized they had better try and program such a game. Clever programming made the impossible possible, something that would be seen many times on the Amiga later on in our story.

Having achieved such great success with the VCS game console, Jay's next assignment was designing Atari's first personal computer system. In 1978, personal computers had barely been invented, and the few companies that had developed them were often small, quirky organizations, barely moved out of their founder's garages. Apple (started by the aforementioned Steve Jobs and Steve Wozniak) was one of the major players, as was Tandy Radio Shack and even Commodore (we will get to the full Commodore story in a future installment).

An early ad for the Atari 400/800. Note the years!

Firstly, to avoid competition with the VCS, they downplayed the importance or even the existence of games for the platform, insisting that it be considered a "serious" machine. Ironically, when the company was struggling to produce a successor to the 2600, they ended up simply putting an Atari 400 in a smaller, keyboard-less case. Even worse, Atari was reticent about giving out information about how the hardware worked, thinking that such data was to be kept a trade secret, known only to internal Atari programmers.

Some individuals, such as the superstar game programmer John Harris, considered this a challenge, and they managed to unlock most of the Atari's secrets by a process similar to reverse engineering. But the lack of strong third-party development for the computer doomed it to an also-ran status in the nascent industry.

After the 400 and 800 had shipped, Atari management wanted Jay to continue developing new computers. However, they insisted that he work with the same central processing unit, or CPU, that had powered the VCS and the 400/800 series. That chip, the 6502, was at the heart of many of the computers of the day. But Jay wanted to use a brand new chip that had come out of Motorola's labs, called the 68000.

The 68000

The 68000 was an engineer's dream: fast, years ahead of its time, and easy to program. But it was also expensive and required more memory chips to operate, and Atari management didn't think that expensive computers constituted a viable market.

Anyone who had studied the history of electronics knew that in this industry, what was expensive now would gradually become cheaper over time, and Jay pleaded with his bosses to reconsider. They steadfastly refused.

The dream chip: Motorola's 68000

Atari at this time was changing, and not necessarily for the better. The company's rapid growth had resulted in a cash flow crunch, and in response Nolan Bushnell had sold the company to Warner Communications in 1978. The early spirit of family and cooperation was rapidly vanishing. The new CEO, Ray Kassar, had come from a background in clothing manufacturing and had little knowledge of the electronics industry.

He managed to alienate all of Atari's VCS programmers, refusing their demands for royalty payments on the games they designed (which were at the time selling in incredible numbers) and even referred to them at one point as "prima donna towel designers."

His attitude led to a large number of Atari programmers quitting the company and forming their own startups, such as the very successful Activision, started by Larry Kaplan. Larry had been Atari's very first VCS programmer.

Jay had incredible visions of the kind of computer he could create around the 68000 chip, but Atari management simply wasn't interested, so finally he gave up in disgust and left the company in early 1982. He joined Zimast, a small electronics company that made chips for pacemakers. It seemed like his dream was dead.

However, as would happen many times in the short history of this industry, forces would align to make a previously impossible dream possible. While technology was advancing rapidly, the number of people who really understood the technology remained small.

These people would not be limited by the short-sighted management of large companies. They would find each other, and together, they would find a way.

It was this feeling that caused Larry Kaplan to pick up the phone and make the fateful call to Jay Miner in the middle of 1982.

Larry was enjoying the fruits of his success with Activision, yet still felt the limitations of being primarily a developer for the Atari VCS. Video games were a hot property at this time, and there was no shortage of investment money that people were willing to put into new gaming startups.

A consortium out of Texas, which included an oil baron (who had also made money from sales of pacemaker chips, which was how Jay knew him) and three dentists, had approached Larry about investing seven million dollars in a new video game company.

Larry immediately phoned Jay at Zimast to ask if he would like to be involved in this new venture. The idea was to spread the development around: Larry and Activision would develop the games, Jay and Zimast would design and build the new hardware to run them, and everybody would make money. They had to quickly decide on a name for the new venture, and "Hi-Toro" was chosen because it sounded both high-tech and Texan. The company needed a management person to oversee all this development, so David Morse was recruited from his position of vice president of marketing at Tonka Toys. A small office was located in Santa Clara, California, and the three co-founders got down to the business of designing the ultimate games machine.

It was around this time that Larry Kaplan began to get cold feet about the whole idea. Jay speculated that perhaps things weren't moving fast enough for him, or maybe he was worried that the games industry was becoming too crowded, but he suddenly decided to quit the company in late 1982.

It turned out that Kaplan had been given a very generous offer from Nolan Bushnell to come back to Atari, an offer that later turned out to be less than expected.

In any case, Kaplan's departure presented the fledgling venture with a problem: they had no chief engineer. While Larry was a software developer and not a true hardware engineer, he had still been in charge of engineering management for the company. The next logical choice for this position was Jay Miner.

Jay knew this was his chance. He agreed to take over the position of chief of engineering at Hi-Toro under two conditions: He had to be able to make the new video game machine use the 68000 chip, and also make it work as a computer.

A history of the Amiga, part 2: The birth of Amiga

Born as a console, but with the heart of a computer

Game consoles and personal computers are not all that different on the inside. Both use a central processing unit as their main engine (the Apple][, Commodore 64, and the Atari 400/800 all used the same 6502 CPU that powered the original Nintendo and Sega consoles). Both allow user input (keyboards and mice on computers, joysticks and game pads on consoles) and both output to a graphical display device (either a monitor or a TV).

The main difference is in user interaction. Gaming consoles do one thing only: play games, whereas personal computers also allow users to write letters, balance finances and even enter their own customized programs.

Computers cost more, but they also do more. It was not too much of a stretch to imagine the new Hi-Toro console being optionally expandable to a full computer.

However, the investors weren't likely to see things that way. They wanted to make money, and at the time the money in video games dwarfed the money in personal computers. Jay and his colleagues agreed that they would design the new piece of hardware to look like a games unit, with the option of expansion into a full computer cleverly hidden. This was one of those decisions that, in retrospect, seems incredibly prescient.

At the time, it was merely practical: the investors wanted a game console, the new company needed Jay Miner, and Jay wanted to design a new computer. This compromise allowed everyone to get what they wanted. But events were transpiring that would make this decision not only beneficial, but necessary for the survival of the company.

The video game crash

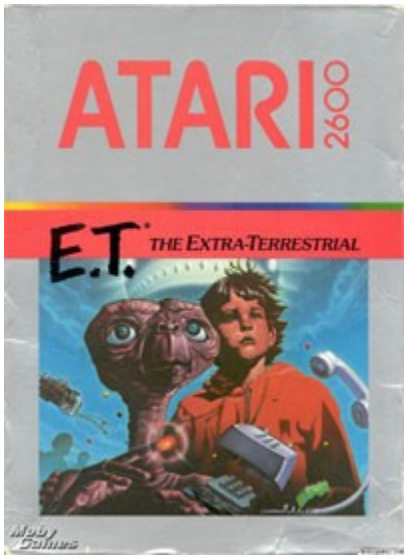
The great video game crash of 1983, was, like all great crashes, easy to predict after it had already happened. With sales of home consoles and video games rising exponentially, companies started to think that the potential for earning money was unlimited. Marketing executives at Atari bragged that they could "shit in a box and sell it."

And inevitably, that's exactly what happened. There were too many software companies producing too many games for the Atari VCS and other competing consoles. The quality of games began to suffer, and the technological limitations of the first generation of video game machines were starting to become insurmountable.

Clever programming could only take you so far. Today, it is understood that each new generation of game consoles has a limited lifecycle, and new hardware platforms are scheduled for release just as the old ones are starting to wane.

Back then, however, the industry was so new that the sinusoidal-like demand for a game platform was not understood at all. People just expected sales to keep going up forever. Just like the dotcom bubble in the late 1990s, a point was reached where the initial enthusiasm was left behind and replaced with sheer insanity.

This point can be traced precisely to the release of a new game for the Atari VCS in late 1982, timed to coincide with the release of a new blockbuster movie: E.T. The Extra Terrestrial.



The game that ended it all

Atari paid millions of dollars for the license to make the game, but marketing executives demanded that it be developed and sent to manufacturing in six weeks. Good software is like good wine: it cannot be rushed.
The game that Atari programmers managed to produce turned out to be a very nasty bottle of vinegar. It was repetitive, frustrating, and not much fun.

Atari executives, however, did not realize this. They compounded their mistake by ordering the manufacture of five million cartridges, which was nearly the number of VCS consoles existing at the time. But the insanity didn't stop there.

For the release of the game Pac-Man, Atari actually manufactured more cartridges than there were VCS consoles to run them! An Atari marketing manager was actually asked about this disparity, and his response clearly expressed his total disconnect from reality.

He said that people might like to buy two copies: one for home, and one for a vacation cottage!

Instead of two copies, most people decided to buy zero. Atari (and thus Warner) posted huge losses for the year and were forced to write off most of its unsold inventory of VCS cartridges. In a famous ceremony, tens of thousands of E.T., Pac-Man, and other carts were buried and bulldozed in an industrial waste dump.

The E.T. debacle was the exact moment when the bubble burst. Millions of kids around the world decided that Atari and, by extension, all console video games weren't "cool" anymore. Sales of all game systems and software plummeted.

Suddenly, venture funding for new game companies vanished.

Personal computer sales, however, were still climbing steadily. Systems like the Apple][, the Commodore 64, and even the new IBM PC were becoming more popular in the home. Parents could justify paying a little more money for a system that was educational, while the kids rejoiced in the fact that these little computers could also play games.

This set the stage for a fateful meeting. The nervous Hi-Toro investors, watching the video game market crumble before their eyes, anxiously asked Jay Miner if it might be possible to convert the new console into a full-blown personal computer. Imagine their relief as he told them he had been planning this all along!

There was only one problem remaining: the company's name. Someone had done a cursory check and found out that the name Hi-Toro was already owned by a Japanese lawnmower company. Jay wanted his new computer to both friendly and sexy. He suggested "Amiga," the Spanish word for female friend.

Perhaps not coincidentally, Amiga would also come before Atari in the phone book! Jay wasn't terribly pleased with the name initially. However, as none of the other employees could think of anything better, the name stuck.

Now everything was in place. The players were set; the game was under way.The dream was becoming a reality.

Early days at Amiga

Jay Miner once described the feeling of being involved in the young Amiga company as being like Mickey Mouse in the movie Fantasia, creating magical broomsticks to help carry buckets of water, then being unable to stop his runaway creations as they multiplied beyond control.

He immediately hired four engineers to help him with the hardware design, and a chief of software design, Bob Pariseau.

Bob then quickly hired four more software engineers to help him.
The young company quickly became an unruly beast, devouring money at an insatiable pace. But it was necessary.In high technology, even more so than in other industries, speed is always important, and there is never enough time.

Things change so quickly that this year's hot new design looks stale and dated next year. The only way to overcome this problem is to apply massive amounts of concentrated brainpower and come up with a very clever design, then rush as quickly as possible to get the design through the initial prototype and into an actual product. Even the inelegant, unimaginative and graphically inept IBM PC, introduced in 1981, was the result of an unprecedented one-year crash building program. Not even the mighty IBM, with resources greater than those of small nations, was immune to the pressures of time.

A tiny company like Amiga had even greater problems. On top of the maddening rush to ramp up staffing and develop a new product, Jay and his team had to worry about much larger corporations and their industrial espionage teams stealing their new ideas and applying much greater resources to beat them to market. Nobody knew what Amiga, Inc. was up to, and the company's founders liked it that way. So an elaborate two-pronged attack was devised to ensure that nobody got wise to Amiga's ambitions before they were ready to show them to the world.

Firstly, the company would create a deceptive business front. This had to be something simple enough that it would not take away too many resources from the actual work, yet still deliver actual products and generate some revenue. The company decided to stick to its videogame roots and produce hardware and software add-ons for the Atari VCS.

The Amiga Joyboard. Note the small Amiga logo at bottom

One of the first products, a collector's item today, was the Amiga Joyboard, a kind of joystick that was used by sitting or standing on top of it and leaning back and forth, left and right. The company also wrote some simple games for it that involved skiing and skateboarding. While income from these games and peripherals helped sustain the company in its early days, it was also affected by the video game crash of '83 and sales quickly dwindled.

This short-lived era of the young company's history had one long-lasting impact on the Amiga computer. RJ Mical, a programmer writing some of the complicated routines that would bring the Amiga to life, developed a simple game that used the Joyboard and was designed to try and help him to relax. The game was called "Zen Meditation" and the object was to try and sit absolutely still.

The game was a kind of running joke in the Amiga offices, and when the time came to write the text for a serious error message for the Amiga operating system, a programmer came up with the term "Guru Meditation Error." This would remain in the operating system for years to come, until a nameless and unimaginative Commodore executive insisted on removing the Guru and making the message into "Software Failure."

The second front of deception against industrial espionage involved codenames for the powerful new custom chips the team was designing for the Amiga computer. Dave Morse decided that henceforth all these chips would be referred to by women's names. The idea was that if anyone intercepted telephone conversations between Amiga people, they would be unable to figure out that they were discussing parts of a computer. The idea of "Agnes" being temperamental or "Denise" not living up to expectations also appealed to the engineers' sense of humor. The computer itself was codenamed "Lorraine," the name of Dave's wife.

Jay Miner may have been leading the team, but the details of the new computer were hammered out at team design meetings, held in a seminar-like room that had whiteboards covering the walls.

Everyone could pitch for inclusion in the machine, and the small group would have to come to a consensus about which features to include and which to leave out. Engineering is all about tradeoffs, and you can't just decide to include "the best of everything" and have it all work. Cost, speed, time to develop, and complexity are just some of the factors that must be taken into account at this crucial stage of a new computer. The way the Amiga team came to a consensus was with foam rubber baseball bats.

It isn't known who first came up with the idea, but the foam bats became an essential part of all design meetings. A person would pitch an idea, and if other engineers felt they were stupid or unnecessary, they would hit the person over the head with a bat. As Jay said, "it didn't hurt, but the humiliation of being beaten with the bat was unbearable." It was a lighthearted yet still serious approach, and it worked. Slowly the Amiga design began to take shape.

Hold and modify

Jay had always had a passion for flight simulators, and it was something that would stay with him for the rest of his life. A friend of his took him on a field trip to Link, a company that made multimillion-dollar flight simulators for the military. Jay was enthralled by the realistic sights and sounds and vowed that he would make the Amiga computer capable of playing the best flight simulators possible.

Two major design decisions came out of this trip: the blitter and HAM mode. Jay had already read about blitters in electronic design magazines and had taken a course at Stanford on their use, so they were not a new idea for him. However, the flight simulator experience had made him determined to create the best possible blitter for the Amiga.

A blitter is a dedicated chip that can move large chunks of graphics around on the screen around very quickly without having to involve the CPU.
All modern video cards have what is essentially an advanced descendant of a blitter inside them. Again, Jay was ahead of his time. HAM mode, which stood for Hold And Modify, was a way of getting more colors to display on the screen than could normally fit into the display memory. At the time, memory chips were very expensive, and the cost for displaying millions of colors at once was too high even for military applications like the Link simulator. So instead of storing all the color information for each dot (or pixel) on the display, the hardware could be programmed to start with one color and then change only one component of it (Hue, Saturation or Luminosity) for each subsequent pixel along each line. Jay decided to put this into the Amiga.

Later on in the design process, Jay would become concerned that HAM mode was too slow and even asked his chip layout artist if he could take it out. The chip designer replied that it would take many months and leave an aesthetically unappealing "hole" in the middle of the chip. Jay decided to keep the feature in, and later admitted that this was a good decision. The Amiga shipped with the ability to display 4096 colors in this mode, far more than any of its competitors, with clever programmers squeezing even more colors out of future Amiga chipset revisions.

Despite HAM being suitable only for displaying pre-calculated images, a software company would even develop a graphics editor that operated in HAM mode. Like the chess game on the Atari 2600 before it, programmers would make the impossible possible on the Amiga.

Screens like no other

Another new invention for the Amiga computer was the "copper" chip. This was essentially a special-purpose CPU designed specifically for direct manipulation of the display. It had only three instructions, but it could directly access any part of the other display chips at any time.

What's more, it could turn amazing tricks in the fraction of a second that it took for the monitor to refresh the display. This allowed a trick that no other computer has ever reproduced: the ability to view multiple different screens, opened at different resolutions, at the same time. These "pull-down" screens would amaze anyone who saw them.

Modern computers can open different screens at different resolutions (say, for example, to open a full-screen game at a lower resolution than the desktop is displaying, in order to play the game faster or at a higher frame rate) but they can only switch between these modes, not display multiple modes at once.

The design eventually coalesced down to three chips named Agnes, Denise, and Paula. Agnes handled direct access to memory and contained both the blitter and copper chips. Denise ran the display and supported "sprites," or graphical objects that could be displayed and moved over a complex background without having to redraw it. Finally, Paula handled sound generation using digitally-sampled waveforms and was capable of playing back four channels at once: two on the left stereo channel and two on the right. It would be years before competing computer sound capabilities came anywhere close to this ability.

Paula also controlled the Amiga's floppy disk drive. These chips formed the core of what would be referred to as the Amiga's "custom chipset." However, they did not yet exist, except on paper.

While the software development team was able to get started planning and writing programs that would support the chipset's features, the hardware team needed some way to test that their chips would actually work before committing to the expense of manufacturing them. In addition, the operating software could not be fully tested without having real Amiga hardware to run it on.

A history of the Amiga, part 3: The first prototype

Prototyping the hardware

Modern chips are designed using high-powered workstations that run very expensive chip simulation software. However, the fledgling Amiga company could not afford such luxuries. It would instead build, by hand, giant replicas of the silicon circuitry on honeycomb-like plastic sheets known as breadboards.

Breadboards are still used by hobbyists today to rapidly build and test simple circuits. The way they work is fairly simple. The breadboard consists of a grid of tiny metal sockets arranged in a large plastic mesh.

Short vertical strips of these sockets are connected together on the underside of the board so that they can serve as junctions for multiple connectors. Small lengths of wire are cut precisely to length and bent into a staple-like shape, with the exposed wire ends just long enough to drop neatly into the socket. Small chips that perform simple logic functions (such as adding or comparing two small numbers in binary code) straddle the junctions, their centipede-like rows of metal pins precisely matching the spacing of the grid.

The Lorraine prototype, with three custom "chips"
Image courtesy of Secret Weapons of Commodore

At the time, nobody had ever designed a personal computer this way. Most personal computers, such as the IBM PC and the Apple][, had no custom chips inside them. All they consisted of was a simple motherboard that defined the connections between the CPU, the memory chips, the input/output bus, and the display. Such motherboards could be designed on paper and printed directly to a circuit board, ready to be filled with off-the-shelf chips.

Some, like the prototypes for the Apple][, were designed by a single person (in this case, Steve Wozniak) and manufactured by hand. The Amiga was nothing like this. Its closest comparison would be to the minicomputers of the day: giant, refrigerator-sized machines like the DEC PDP-11 and VAX or the Data General Eagle. These machines were designed and prototyped on giant breadboards by a team of skilled engineers. Each one was different and had to be designed from scratch; although to be fair, the minicomputer engineers had to design the CPU as well, a considerable effort all by itself!

These minicomputers sold for hundreds of thousands of dollars each, which paid for the salaries of all the engineers required to construct them.

The Amiga team had to do the same thing, but for a computer that would ultimately be sold for under $2,000. So there were three chips, and each chip took eight breadboards to simulate, about three feet by one and a half feet in size, arranged in a circular, spindle-like fashion so that all the ground wires could run down the center. Each board was populated with about 300 MSI logic chips, giving the entire unit about 7200 chips and an ungodly number of wires connecting them all.

Constructing and debugging this maze of wires and chips was a painstaking and often stressful task. Wires could wiggle and lose their connections. A slip of a screwdriver could pull out dozens of wires, losing days of work. Or worse, a snippet of cut wire could fall inside the maze, causing random and inexplicable errors.

However, Jay never let the mounting stress get to him or to his coworkers. The Amiga offices were a relaxed and casual place to work. As long as the work got done, Jay and Dave Morse didn't care how people dressed or how they behaved on the job. Jay was allowed to bring his beloved dog, Mitchy, into work. He let him sit by his desk and had a separate nameplate manufactured for him.

Jay even let Mitchy help in the design process. Sometimes, when designing a complex logic circuit, one comes to a choice of layout that could go either way. The choice may be an aesthetic one, or merely an intuitive guess, but one can't help but feel that it should not be left merely to random chance. On these occasions Jay would look at Mitchy, and his reaction would determine the choice Jay would make.

Slowly, the Amiga's custom chips began to take shape. Connected to a Motorola 68000 CPU, they could accurately simulate the workings of the final Amiga, albeit more slowly than the final product would run. But a computer, no matter how advanced, is nothing more than a big, dumb pile of chips without software to run on it.

Raising the bar for operating systems

All computers since the very first electronic calculators required some kind of "master control program" to handle basic housekeeping tasks such as running application programs, managing the user environment, talking to peripherals such as floppy and hard disks, and controlling the display.

This master program is called the operating system, and for most personal computers of the day, it was a very simple program that was only capable of doing one thing at a time.

Jay's specialty was designing hardware, not software, so he had little input on the design of the Amiga's operating system. But he did know that he wanted his computer to be more advanced than the typical personal computers of the time running such primitive operating systems as AppleDOS and MS-DOS.

His hire for chief of software engineering, Bob Pariseau, did not come from a background in microcomputers.

He worked for the mainframe computer company Tandem, which made massive computers that were (and are still today) used by the banking industry.

Bob was used to his powerful computers that could handle many tasks and transactions at one time. He saw no reason why microcomputers should not be capable of the same thing. At the time, there were no personal computers that could multitask, and it was generally felt that the small memory capacities and slow CPU speeds of these machines made multitasking impossible. But Bob went ahead and hired people who shared his vision.

The four people he hired initially would later become legends of software development in their own right. They were RJ Mical, Carl Sassenrath, Dale Luck, and Dave Needle. Carl's interview was the simplest of all: Bob asked him what his ultimate dream job would be, and he replied, "To design a multitasking operating system." Bob hired him on the spot.

Carl Sassenrath had been hired from Hewlett-Packard where he had been working on the next big release of a multitasking operating system for HP's high-end server division. According to Carl: "What I liked about HP was that they really believed in innovation. They would let me buy any books or publications I wanted... so I basically studied everything ever published about operating systems. I also communicated with folks at Xerox PARC, UC Berkeley, MIT, and Stanford to find out what they were doing.

In 1981-82 I got to know CPM and MSDOS, and I concluded that they were poor designs. So, I started creating my own OS design, even before the Amiga came along."

So the Amiga operating system would be a multitasking design, based on some of Carl's ideas that would later be called a "microkernel" by OS researchers in academia. Carl had invented the idea before it even had a name; the kernel, or core of the operating system, would be small, fast, and capable of doing many things at once, attributes that would then pervade the rest of the operating system.

The decision to make a multitasking kernel would have a huge impact on the way the Amiga computer would perform, and even today the effects can still be felt. Because the mainstream PC market did not gain true multitasking until 1995 (with Windows 95) and the Macintosh until 2001 (with OSX), an entire generation of software developers grew up on these platforms without knowing or understanding its effects, whereas the Amiga, which had this feature since its inception, immediately gave its developers and users a different mindset: the user should never have to wait for the computer.
As a result, programs developed for the Amiga tend to have a different, more responsive feel than those developed for other platforms.

Adding a GUI

There was one more significant design decision that was made about the Amiga at this time: to design it with a graphical user interface.

Most personal computers at the time were controlled by a command line interface; the user had to type in the name of a program to run it and enter a long series of commands to move files or perform maintenance tasks on the computer.

The idea of a graphical user interface was not new. Douglas Engelbart had demonstrated most of its features along with the world's first computer mouse in 1968, and researchers at Xerox PARC had created working models in the mid-70's. At the beginning of the 1980's, it seemed everyone was trying to cash in on the graphical interface idea, although developing it on the primitive computers of the day was problematic. Xerox itself released the Star computer in 1981, but it cost $17,000 and sold poorly, serving mostly as an inspiration for other companies. Apple's version, the Lisa, came out in 1983. It cost $10,000 and also sold poorly. Clearly, personal computers were price-sensitive, even if they had advanced new features.

Apple solved the price issue by creating a stripped-down version of the Lisa. It took away the large screen, replacing it with a tiny 9 inch monochrome monitor. Instead of two floppy drives, the new machine would come with only one. There were no custom chips to accelerate sound or graphics. And as much hardware as possible was removed from the base model, including the memory: the operating system was completely rewritten to squeeze into 128 kilobytes of RAM. The stripped-down operating system was only capable of running one application at a time: it couldn't even switch between paused tasks.

This was the Macintosh, which was introduced to the world in dramatic fashion by Steve Jobs in January of 1984. What most people don't remember about the Macintosh was that initially it was not a success: it sold reasonably well in 1984, but the following year sales actually went down. The Mac in its original incarnation was actually not very useful. The built-in word processor that came with the machine was limited to only eight pages, and because of the low memory and single floppy drive, making a backup copy of a disk took dozens of painful, manual swaps.

The Amiga operating system team wasn't thinking like this. The hardware design group wasn't compromising and stripping things down to the bare minimum to save money, so why should they?

One of the more difficult parts of writing a graphical user interface is doing the low-level plumbing, called an API, or Application Programming Interface, that other programmers will use to create new windows, menus, and other objects on the system.

An API needs to be done right the first time, because once it is released to the world and becomes popular, it can't easily be changed without breaking everyone's programs. Mistakes and bad design choices in the original API will haunt programmers for years to come.

The Amiga user interface, Workbench.

RJ Mical, the programmer who had come up with the "Zen Meditation" game, took this task upon himself. According to Jay Miner, he sequestered himself in his office for three weeks, only coming out once to ask Carl Sassenrath a question about message ports. The resulting API was called Intuition, an appropriate name given its development. It wound up being a very clean, easily-understandable API that programmers loved. In contrast, the API for Windows, called Win16 (later updated to Win32) was constructed by a whole team of people and ended up as a mishmash that programmers hated.

Working 90-hour weeks

RJ Mical recalled what life was like back in those busy early days:"We worked with a great passion... my most cherished memory is how much we cared about what we were doing. We had something to prove... a real love for it. We created our own sense of family out there.

"Like the early days at Atari, people were judged not on their appearance or their unusual behavior but merely on how well they did their jobs. Dale Luck, one of the core OS engineers, looked a bit like a stereotypical hippie, and there were even male employees who would come to work in purple tights and pink fuzzy slippers. "As long as the work got done, I didn't mind what people looked like," was Jay Miner's philosophy. Not only was it a family, but it was a happy one: everyone was united by their desire to build the best machine possible.

Why was everybody willing to work so hard, to put in tons of late (and sometimes sleepless) nights just to build a new computer? The above and beyond dedication of high-tech workers has been a constant ever since Silicon Valley became Silicon Valley.

Companies have often reaped the rewards from workers who were willing to put in hundreds of hours of unpaid overtime each month. Managers in other industries must look at these computer companies and wonder why they can't get their workers to put in that kind of effort.

Part of the answer lies with the extreme, nearly autistic levels of concentration that are achieved by hardware and software engineers when they are working at peak efficiency. Everyday concerns like eating, sleeping, and personal hygiene often fade into the background when an engineer is in "the zone." However, I think it goes beyond that simple explanation. Employees at small computer companies have a special position that even other engineers can't hope to achieve. They get to make important technical decisions that have far-reaching effects on the entire industry. Often, they invent new techniques or ideas that significantly change the way people interact with their computers.

Giving this kind of power and authority to ordinary employees is intoxicating; it makes people excited about the work that they do, and this excitement then propels them to achieve more and work faster than they ever thought they could. RJ Mical's three-week marathon to invent Intuition was one such example, but in the story of the Amiga there were many others.

The employees of Amiga, Inc. needed this energy and passion, because there was a hard deadline coming up fast. The Consumer Electronics Show, or CES, was scheduled for January 1984.

The January CES and the buyout of Amiga

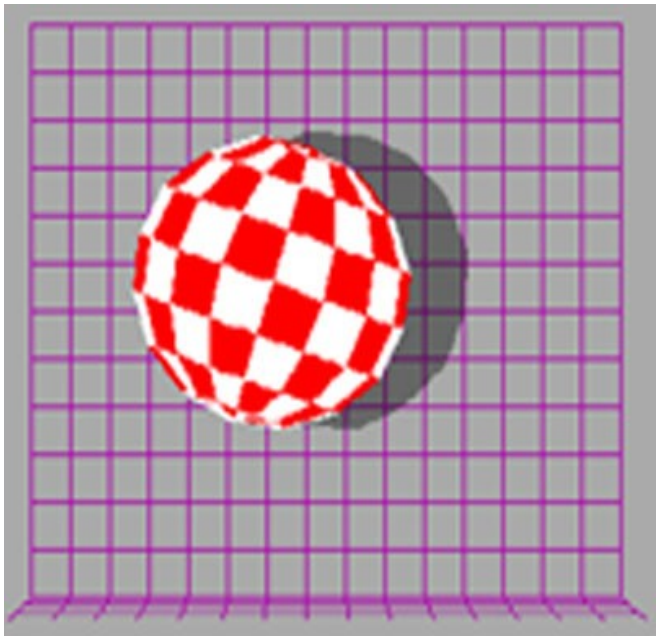
CES had expanded significantly since its inception in 1967. The first CES was held in New York City, drawing 200 exhibitors and 17,500 attendees. Among the products that had already debuted at CES were the VCR (1970), the camcorder (1981), and the compact disc player (also 1981). CES was also home to the entire nascent video game industry, which would not get its own expo (E3) until 1995. Amiga, Inc. didn't have a lot of money left over for shipping its prototype to the show, and the engineers were understandably nervous about putting such a delicate device through the rigors of commercial package transport.

Instead, RJ Mical and Dale Luck purchased an extra airline seat between the two of them and wrapped the fledgling Amiga in pillows for extra security. According to airline regulations, the extra "passenger" required a name on the ticket, so the Lorraine became "Joe Pillow," and the engineers drew a happy face on the front pillowcase and added a tie! They even tried to get an extra meal for Joe, but the flight attendants refused to feed the already-stuffed passenger.
The January 1984 CES show was an exciting and exhausting time for the Amiga engineers. Amiga rented a small booth in the West Hall at CES, with an enclosed space behind the public display to showcase their "secret weapon," the Lorraine computer.

A guarded door led into the inner sanctum, and once inside people could finally see the massive breadboarded chips, sitting on a small table with a skirt around the edges. Skeptical customers would often lift the skirt after seeing a demonstration, looking for the "real" computer underneath.

The operating system and other software were nowhere near ready, so RJ Mical and Dale Luck worked all night to create software that would demonstrate the incredible power of the chips. The first demo they created was called Boing and featured a large, rotating checkered ball bouncing up and down, casting a shadow on a grid in the background, and creating a booming noise in stereo every time it hit the edge of the screen.

The noise was sampled from Bob Pariseau hitting the garage door with one of the team's celebrated foam baseball bats. The Boing Ball would wind up becoming an iconic image and became a symbol for the Amiga itself.



The famous Amiga Boing Ball demo

The January CES was a big success for the Amiga team, and the company followed it up by demonstrating actual prototype silicon chips at the June CES in Chicago, but the fledgling company was rapidly running out of money. CEO Dave Morse gave presentations to a number of companies, including Sony, Hewlett-Packard, Philips, Apple, and Silicon Graphics, but the only interested suitor was Atari, who lent the struggling company $500,000 as part of a set of painful buyout negotiations. According to the contract, Amiga had to pay back the $500,000 by the end of June or Atari would own all of their technology. "This was a dumb thing to agree to but there was no choice," said Jay Miner, who had already taken a second mortgage out on his house to keep the company going.

Fortunately for Amiga (or unfortunately, depending on how you imagine your alternate histories) Commodore came calling at the last minute with a buyout plan of its own. It gave Amiga the $500,000 to pay back Atari, briefly thought about paying $4 million for the rights to use the custom chips, and then finally went all in and paid $24 million to purchase the entire company. The Amiga had been saved, but it now belonged to Commodore.

A history of the Amiga, part 4: Enter Commodore

Deus ex machina

The company that rescued Amiga in 1984 was the creation of a single man. Born in Poland in 1928 as Idek Tramielski, he was imprisoned in the Nazi work camps after his country was invaded in World War II. Rescued from the camps by the US Army, he married a fellow concentration camp survivor named Helen Goldgrub, and the two emigrated to the United States. Upon arrival, he changed his name to Jack Tramiel.

Jack Tramiel

Jack enlisted in the US Army in 1948 and served in the Equipment Repair Office. He served two tours of duty in Korea, then left the Army to work at a small typewriter repair company. In 1955, Jack and his wife left for Canada to start their own typewriter manufacturing firm.
Jack wanted a military-sounding name for the company, but General and Admiral were already taken, so he settled on Commodore after seeing a car on the street with that name.
The little firm grew quickly, going public in 1962, but it became enveloped in a financial scandal that threatened to consume the company. Jack was a survivor, however, and would not give up. He found a financier named Irving Gould who purchased a large chunk of Commodore and moved it into new directions.

Inexpensive Japanese typewriters were eating into Commodore's profits, so the company got into selling calculators instead. Then cheap calculators from Japan and from US firms like Texas Instruments threatened to take that business away as well. Jack realized that in order to survive the price wars, he needed to control the chips that went into the calculators. In 1976 he bought MOS Technologies, the same company that split off from Motorola to produce the legendary 6502 chip that ended up in the Apple][, various game consoles, and the Atari 400/800 series.

The MOS purchase got Commodore into the computer business, starting with the PET, then the low-cost VIC 20, and finally in 1982 the company released the best-selling personal computer model of all time: the Commodore 64.

The 64 was a huge hit, selling over 22 million machines over its life span and firmly cementing Commodore as one of the major players in the burgeoning personal computer industry. However, things were not all rosy at the company. Jack was determined not just to compete with other computer companies, but to destroy them. "Business is war," was his motto, and while the price war he initiated did take out some competitors, including getting revenge against TI, which withdrew from the computer business in October 1983; it also strained Commodore's profits.

Tramiel often fought with Gould over matters of money: the financier wanted Jack to grow the business without any extra capital, but Jack wanted more cash in order to lower costs and thus wipe out the rest of his competitors. "We sell computers to the masses, not the classes," he once said, reflecting the price difference between a $199 Commodore 64 and machines from Apple and IBM that cost thousands of dollars.
In the end, as is often the case when battling your financiers, the money people won. Jack Tramiel was forced out of his own company by the board of directors in late 1983.

This ouster would have a huge effect on the fledgling Amiga company, because Tramiel did not go quietly.

Jack Tramiel was a study in conflicts and contradictions, like any human being, but more so. His hardheaded management style made him enemies, but also made him steadfast friends: many key employees quit Commodore when he left to join him in his new ventures. His tendency to jump from project to project paid huge dividends when the company moved from the PET to the VIC-20 to the Commodore 64, but that same line of thinking hurt the company when ill-conceived successors such as the Plus/4 failed in the marketplace. So it should come as no surprise that Tramiel's departure from Commodore both saved and doomed the Amiga at the same time.

Before Tramiel had left, Commodore had already engaged in halfhearted talks to purchase the struggling Amiga, Inc., but nothing had come from them. Atari was developing a new personal computer and game console and wanted access to the Amiga chipset. The initial offer was for $3 a share and kept getting lower. When it hit 98¢ per share, both sides walked away from the table. It was at this point that Atari "loaned" Amiga $500,000 to continue operations for a few more months.

This poisonous deal was put together by none other than Jack Tramiel, who had managed to purchase Atari's computer division after being kicked out of Commodore. Due to the video game crash of 1983, Atari's parent company Warner Communications had been looking to dump the computer and home console video game portions of Atari (they would retain the arcade division, which was still doing well), and Tramiel managed to work out a spectacular deal that gave him ownership of Atari's computer division for no money down.

When Jack left Commodore for Atari, the former company's stock fell while the latter's rose, as public opinion still considered (and rightly so) Jack to have been the driving force that built Commodore's success. A steady flow of engineers followed Tramiel to Atari, which prompted Commodore to sue Atari for theft of trade secrets. (Tramiel, in his inimitable style, would later countersue; both lawsuits were eventually settled out of court). To compete with Tramiel and regain the engineering talent they had lost, Commodore decided to purchase Amiga wholesale. Keeping the original Amiga team intact saved the computer as Jay Miner and the others had originally envisioned it.

However, it also made Tramiel more determined than ever to get his revenge on Commodore. That revenge would come in the form of the Atari ST, sometimes called the Jackintosh, which was rushed into production to compete against the Amiga. Had Jack never been kicked out of Commodore, the Atari line of computers might have just faded into oblivion after Warner had dumped the company. The competition between Amiga and Atari would wind up hurting both platforms as they focused their resources on fighting each other rather than making sure they had a place in a world increasingly dominated by the IBM PC. Still, all that was in the future, and the Amiga team, now a fully-owned subsidiary of Commodore, had but one thing on their minds: finishing the computer.

Finalizing the design

One hugely positive benefit about being owned by a large computer company was that the Amiga team no longer (for the moment, anyway) had to worry about money. The team was moved 10 miles to a spacious, rented facility in Los Gatos, California. They could afford to hire more engineers, and the software development team went from having 10 people sharing a single Sage workstation to everyone having their own SUN on their desk.

The influx of resources made the release of the Amiga computer possible, but it was still a race against time to get the computer finished before the competition took away the market.

While the hardware was mostly done, pending a few adjustments by Jay Miner and his team, the software (as is usually the case in high-tech development) was falling behind schedule. The microkernel, known as Exec, was mostly complete, thanks to the brilliant work by Carl Sassenrath, and the GUI was coming together as well, building on RJ Mical's solid framework (for a short time, his new Commodore business card read "Director of Intuition").

However, there was a third layer necessary to complete the picture. Exec, like modern microkernels, handled basic memory and task management, but there was still a need for another component to handle mundane tasks such as the file system and other operating system duties.

The CAOS debacle

Originally, that third layer was known as CAOS, which stood for the Commodore Amiga Operating System. Exec programmer Carl Sassenrath wrote up the design spec for CAOS, which had all sorts of neat features such as an advanced file system and resource tracking. The latter was a method of keeping track of such things as file control blocks, I/O blocks, message ports, libraries, memory usage, shared data, and overlays, and freeing them up if a program quit unexpectedly.

As the Amiga software engineers were already behind schedule, they had contracted out parts of CAOS development to a third party. Still, as is often the case in software, the development hit some unforeseen roadblocks.

According to Commodore engineer Andy Finkel, the management team "decided that it wouldn't be possible to complete [CAOS] and still launch the Amiga on time, especially since the software guys had already given up weekends at home. And going home. And sleeping."

Lack of time wasn't the only problem. The third-party development house learned that Amiga, Inc., had been bought out by Commodore, and they suddenly demanded significantly more money than had originally been agreed upon.

"Commodore tried to negotiate with them in good faith, but the whole thing fell apart in the end," recalled RJ Mical, who was upset by the whole event. "It was a jerk-butt thing that they did there."

TripOS to the rescue

When the CAOS deal fell apart, the Amiga team suddenly needed a replacement operating system. Relief came in the form of TripOS, written by Dr. Tim King at the University of Cambridge in the 1970s and 80s, and later ported to the PDP-11. Dr. King formed a small company called MetaComCo to quickly rewrite TripOS for the Amiga, where it became known as AmigaDOS.

AmigaDOS handled many of the same tasks as CAOS, but it was an inferior replacement. "Their code was university-quality code," said Mical, "where optimized performance was not important, but where theoretical purity was important." The operating system also lacked resource tracking, which hurt the overall stability of the system. This oversight had repercussions that remain to this day: the very latest PowerPC-compiled version of AmigaOS will still sometimes fail to free up all resources when a program crashes.

Interestingly, TripOS (and thus AmigaOS) was written in the BCPL language, a predecessor to C. Later versions of the operating system would replace this with a combination of C and Assembler.

With the kernel, OS, and GUI ready, and with last-minute adjustments to the custom chips, all that remained was designing a case for the system, which had been dubbed the Amiga 1000. Jay Miner felt it would be appropriate to have the signature from all 53 Amiga team members, both Amiga, Inc. employees and Commodore engineers who later joined the project, to be preserved on the inside of the computer's case. Both Joe Pillow and Jay's dog Mitchy got to sign the case in their own unique way.

Dave Morse, who was still nominally in charge of Commodore Amiga, added his own idea for the case: a raised "garage" on the bottom that users could slide their keyboards into when not in use.

There was only one potential stumbling block preventing the release of the Amiga 1000: the decision about how much RAM to put in the system. Cost-conscious Commodore wanted to ship with only 256KB. Knowing that the operating system and GUI needed more memory, Jay insisted on shipping with 512KB.

The two sides were unable to come to an agreement, so a compromise was reached: the Amiga would ship with 256KB but come with an easily-accessible expansion cage on the front of the case that could accommodate more memory. Jay would later say that he had to "put his job on the line" just to get Commodore to put the expansion port in.

Now that all the pieces were in place, Commodore decided to announce the Amiga to the world. For the first time in the company's history, management decided to pull out all the stops. The Amiga announcement would be the most lavish and expensive new product showcase in the history of personal computers.

The final Amiga 1000 design

The announcement

Commodore rented the Lincoln Center and hired a full orchestra for the Amiga announcement ceremony, which was videotaped for posterity. All Commodore employees were given tuxedoes to wear for the event: RJ Mical one-upped the rest by finding a pair of white gloves to complete his ensemble.

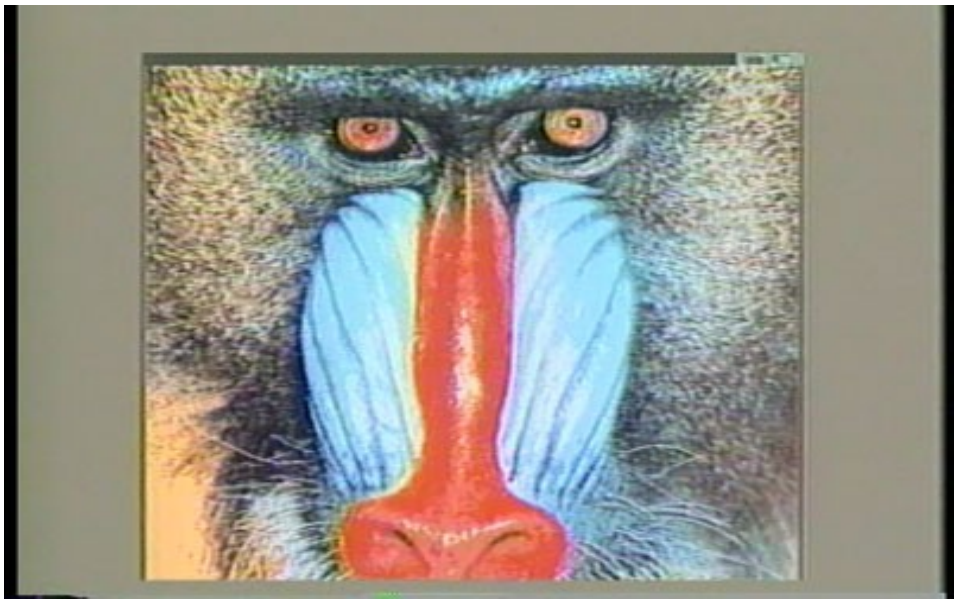
The band played a jaunty little number with tubas and xylophones as a brilliant laser display revealed the Amiga name in its new font.

The master of ceremonies was Commodore marketing vice president Bob Truckenbrode, but he soon gave way to the real star of the show: the head of software engineering, Bob Pariseau. With his long hair elegantly tied back in a ponytail, Pariseau directed the demonstration like a maestro conducting a symphony. With each wave of his hand, he would signal his counterpart, sitting at a real Amiga 1000, to demonstrate each new feature.

"At Amiga, the user controls how he uses his time, not the computer," Pariseau said, as his assistant showed the flexibility of the then-new graphical user interface. He then brought up a graphical word processor called TextCraft to show how a GUI could be applied to everyday work: the word processor featured menus, toolbar buttons, and an on-screen ruler for setting margins and tab stops. Pedestrian stuff for 1995, but astounding for a decade earlier!

Robert Pariseau

Then he moved on to showing off the Amiga's graphics capabilities, showing all 4,096 colors at once on the same screen, followed by a close-up photo of a baboon's face in 640 by 400 resolution: an image that many people might remember gazing at in VGA monitor advertisements from the early 1990s.



It's looking at you!

From static images, he moved on to the Amiga's strong suit: animation. The custom chips included hardware commands to flood fill arbitrary areas: those who remember using flood fill in Photoshop on older computers will remember how slow it was when it had to rely on the CPU.

The Amiga's hardware-accelerated version filled up multiple rotating and intersecting triangles with different colors as they spun across the screen, all at a constant 30 frames per second. Another animation demo, Robot City, showed the Amiga's built-in sprite and collision detection features, allowing large animated characters to move over complex backgrounds and interact with each other.

Hardware flood fills

None of the demos were taking over the entire computer to do their magic. Each full-screen demo could be smoothly slid down to reveal other running applications beneath.

The concept of multitasking was virtually unknown for personal computer users in 1985, and Bob went through several examples of how this feature could be used not just for entertainment but for business applications as well. A bar chart and pie chart were built simultaneously from the same numerical data, and the user could quickly switch from one window to another to see the results in either format. Moving on from graphics to sound, Bob demonstrated the four-channel synthesized sound hardware by using the keyboard as a virtual piano playing various different sampled instruments.

"With all four channels going simultaneously, the 68000 [CPU] is idle," Pariseau commented, something that would not be true for many years in other computers until sampled waveform sound cards became available for Pcs.

A close-up of the Amiga operator at the keyboard showed his fingers shaking slightly, there was a lot riding on these demos, and the software was brand new and still largely untested. Yet the Amiga performed masterfully in its first time on stage, without crashing once.

The next demonstration was of computer-generated speech: the Amiga spoke in a male voice, a female voice, a fast and a slow voice, and all were pitch-modulated to sound more like a real person; the last voice was spoken in a monotone, "just like a real computer." This line got a good laugh from the audience.

Even back in 1985, the market was already showing signs of standardizing on the IBM PC platform, and Bob acknowledged this fact in his speech.

"You know, it's hard," he said, "it's hard to be innovative in an industry that has been dominated by one technology for so long. We at Commodore Amiga knew that to do this [introduce a new platform] we had to be at least an order of magnitude better than anything anyone had ever seen. "We've done that," he continued, "and then we decided: why stop there? Why not include that older technology in what we had already done?" Thus was set the stage for the very first IBM PC emulator on the Amiga, called Amiga Transformer. The program was started up, then a PC-DOS installation disk was placed into an attached 5.25 inch floppy drive, and this was replaced with a Lotus 1-2-3 disk.

"Standard, vanilla, IBM DOS," Bob said with a sigh, and the crowd laughed again. Compared to the exciting graphics and sound demos of a few minutes earlier, it was a bit of a letdown seeing the industry standard spreadsheet take over the screen.

To lighten the mood, Bob finished off with a replay of the original Boing Ball demo that was first shown at CES only a year earlier. "We've lived our dream," he said, "and seen it come to life. Now it's your turn. What will you do with the Amiga Computer?"

Andy and Debbie

Two unlikely celebrities were then invited on stage to show what creative folks might do with their Amigas. Deborah Harry, the lead singer of Blondie, walked on stage along with counterculture art icon Andy Warhol, who took a quick appreciative glance at her red dress as they sat down. "Are you ready to paint me now?" Debbie asked, her voice slightly nervous.

Andy sat down in front of the Amiga 1000, looking at it like it was some kind of alien technology from another world. "What other computers have you worked with?" asked resident Amiga artist Jack Hager. "I haven't worked on anything," Andy replied truthfully. "I've been waiting for this one." A nearby video camera was attached to a digitizer, and from this setup a monochrome snapshot of Debbie's face appeared on the Amiga screen, ready for Andy to add a splash of color.

It is a cardinal rule in doing computer demos in public that you never let anyone else take control of the machine, lest they do something off-script that winds up crashing the computer.

The paint program (ProPaint) being used was a very early alpha, and the software engineers knew that it had bugs in it. One of the known bugs was that the flood fill algorithm, the paint program didn't use the hardware fills that were demonstrated earlier, would usually crash the program every second time it was used.

Yet there was Andy clicking here, there, and everywhere with the flood fill. Somehow, the demo gods were smiling on Amiga that day, and the program didn't crash. "This is kind of pretty," Andy said, admiring his work. "I think I'll keep that.

The finished product

The show ended with a short video, powered by the Amiga, of a wireframe ballerina, who then turned into a solid-shaded figure, and finally a fully rotoscoped animated image. A real ballerina then came out on stage and danced in sync with her animated counterpart.

Reactions to the show

While the crowd attending the show went away extremely impressed with what they had seen, the reaction from the rest of the world was mixed. Articles about the demo were published in magazines such as Popular Computing, Fortune, Byte, and Compute.

The Fortune article both praised and dismissed the Amiga at the same time: "While initial reviews praised the technical capabilities of the Amiga, a shell-shocked PC industry has learned to resist the seductive glitter of advanced technology for its own sake."

Think about that last line for a few moments. Can any computer user today honestly say that color, animation, multichannel sound, and multitasking are merely seductive glitter that exists only for its own sake? Like Doug Engelbart's revolutionary demonstration of the first mouse-driven graphical user interface back in 1968, many of the ideas shown in the Amiga unveiling were a little too far ahead of their time, at least for some people.

Nevertheless, Commodore had some great buzz leading up to the introduction of the Amiga 1000. The machine had great hardware and software. It had features that no other computer could even hope to emulate. Freelance writer Louis Wallace described it thusly: "To give you an idea of its capabilities, imagine taking all that is good about the Macintosh, combine it with the power of the IBM PC-AT, improve it, and then cut the price by 75 percent."

This last part was a bit of an exaggeration, but not by much: the final price of the Amiga 1000 was set at $1,295 for the 256KB version and $1,495 for the 512KB one.

This compared favorably to the Macintosh, which had only 128KB and sold for $2,495.

Commodore looked like it had everything going for it. The new Amiga computer was years ahead of the competition, and many people in the company, including Jay Miner, felt that they had a real chance to significantly impact the industry. Sitting in the crowd during the Amiga's unveiling was Thomas Rattigan, an enthusiastic executive who had come from Pepsi and was being groomed for the position of CEO at Commodore. He had big plans for the Amiga. The original designers had achieved their dream by creating the Amiga from nothing, but now bigger dreams were being imagined for the little computer.

Unbeknownst to him, however, larger forces were at work that would turn these dreams into nightmares.

A history of the Amiga, part 5: Postlaunch blues

On the cusp of greatness

By July 1985, Commodore had everything going for it. The Amiga computer had been demonstrated in public to rave reviews, and everyone was excited at the potential of this great technology. That's when the problems started.

The Commodore Plus/4

Commodore's primary woes were always about money, and 1985 was no exception. Sales of the Commodore 64 were still going strong, but the price wars had slashed the profits on the little computer. The company had invested millions of dollars creating new and bizarre 8-bit computers that competed directly against the venerable C-64, such as the wholly incompatible Plus/4, that had no chance in the marketplace. To make things worse, the company had to deal with lawsuits from its ousted founder, Jack Tramiel. Finally, Commodore had invested $24 million to purchase Amiga outright, but as the computer had not gone on sale yet, there was no return on this investment.

All these financial problems put a strain on the company's ability to get the Amiga ready to sell to the public. Without a lot of spare cash, it was difficult to rush the production of the computer. Further software delays pushed back the launch as well. The end result was that the Amiga did not go on sale until August of 1985.

This wouldn't have been a huge problem, had Commodore been able to gather enough resources to ship the machine in quantity. Instead, production delays meant that the computers trickled off the assembly lines, and by October there were only 50 Amiga 1000 units in existence, all used by Commodore for demos and internal software development.

Jack Tramiel's Atari ST

This delay was doubly crippling because Jack Tramiel had managed to rush the development of the Atari ST, using off-the-shelf chips and an operating system and GUI purchased from Digital Research. Tramiel was able to show the ST off at the January CES and started taking orders for the computer shortly thereafter. This sudden competition from Commodore's former CEO took everyone by surprise.

Missing Christmas

Amiga 1000 computers did not start to appear in quantity on retail shelves until mid-November 1985. This was too late to make a significant impact on the crucial holiday buying season. Most retailers make 40 percent or more of their yearly sales over the holidays, and Commodore had missed the boat.

To make matters worse, the company was not really clear about how it was going to sell the computer. The Commodore 64 had been sold at big retail chains like Sears and K-Mart, but marketing executives felt that the Amiga was better positioned as a serious business computer. Astoundingly, Commodore actually turned down Sears' offer to sell Amigas. Back in the 1980s, Sears was a major player in computer sales; I personally used to cherish parental shopping visits so that I could get my hands on the latest in computer technology. The Atari ST was sold there, but the Amiga was not.

Even these blunders might have been mitigated had Commodore come up with some truly amazing advertising campaigns to drum up interest in the new computer. The delays gave the company extra time to do this, but what Commodore came up with was so awful that it sickened many of its own employees.

Bad advertising

Because the Amiga was years ahead of its time compared to the competition, many Commodore executives believed that the computer would sell itself. This was not, and has never been, true of any technology. When personal computers first came on the scene in the late 1970s, most people had no idea what they would be useful for. As a result, the only people who bought them initially were enthusiastic and technically skilled hobbyists, a limited market at best. It took a few killer applications, such as the spreadsheet, combined with an all-out marketing assault, to drive sales to new levels.

The Amiga was in the same position in 1985. It was a multimedia computer before the term had been invented, but there were no killer applications yet. What it needed was a stellar advertising campaign, one that would drive enough sales to get software companies interested in supporting the new platform. Instead, what it got was a half-hearted series of television ads that ran over Christmas and were never seen again. The first commercial had a bunch of zombie-like people shuffling up stairs towards a pedestal, from which a computer monitor emanated a blinding light. It was a poor copy of Apple's famous 1984 advertisement, and failed to generate even a tiny amount of buzz in the industry.

From there, things got worse. The next ad was a rip-off of the ending of 2001: A Space Odyssey and featured an old man turning into a fetus. Some pictures of the commercial's production made their way to the Commodore engineers, and soon the "fetus on a stick" became a standard joke about their company's marketing efforts.

Further advertising used black-and-white and sepia-toned footage of typical family home movies, with some vague narration: "When you were growing up, you learned you faced a world full of competition." Amiga did indeed face a world full of competition, but this kind of lifestyle avant-garde advertising was already being done, and being done much better, by Apple.

What Commodore really needed at that time was some simple comparative advertising. A picture of an IBM PC running in text mode on a green monochrome screen, then a Macintosh with its tiny 9-inch monochrome monitor, then the Amiga with full color, multitasking, animation, and sound. For extra marks, you could even put prices under all three.

Next page: An Amiga ad from November 1985 Image courtesy Amiga History Guide

YOU'VE ALWAYS HAD A LOT OF COMPETITION. NOW YOU CAN HAVE AN UNFAIR ADVANTAGE.

Nobody ever said it was going to be easy. But it just got easier. Now there's Amiga™ the first and only computer to give you a creative edge. Amiga makes you look better, sound better, work faster and more productively.

You can't buy a computer at any price that has all of Amiga's features. Nor can you find one that's easier to use. Amiga lets you point at symbols instead of learning complicated commands.

Amiga is friendly, but it's a powerhouse, too. It has twice the memory of Macintosh™ or IBM® PC. It costs less than either of them and can do everything they can do, better.

No other personal computer gives you over 4,000 colours, stereo sound and incredible dimension. Imagine the advantage of preparing business presentations with colour graphics and sophisticated animation right on your computer.

Need to make creative use of your time? Amiga can do as many as four or five things at once in separate windows on the screen. Not just display them, work on them. No other personal computer can.

Amiga is IBM compatible, too. A simple piece of software teaches Amiga to emulate the IBM operating system, so you can run most IBM programs. You'll have instant access to the largest library of business software in the world, including favourites like Lotus® 1-2-3, and dBase™.

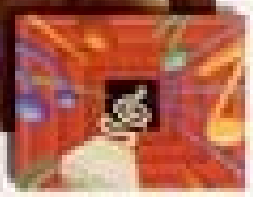
And Amiga is endlessly expandable and adaptable. You can plug in printers (almost any kind), modems, musical keyboards, extra disk drives. You can even expand the memory to a whopping 8 megabytes with an optional expansion module.

See an Authorised Amiga Dealer near you. And don't wait. Your competition is gaining on you. Is that fair?

Amiga by Commodore.

Amiga's 4,096 colours give your business graphics a visible advantage.

Amiga's video telecommunications help sell away and instantly.



Amiga's 4 channels of stereo give you a sound advantage.

AMIGA GIVES YOU A CREATIVE EDGE

*Amiga is a trademark of Commodore-Amiga Inc. †Macintosh is a trademark of Apple Computer Inc. ‡IBM is a registered trademark of International Business Machines Corporation. §Lotus is a registered trademark of Lotus Development Corporation. ¶dBase is a registered trademark of Ashton-Tate Inc. ©1988 Commodore-Amiga Inc. (UK) Limited.

SEE AMIGA AT WORLD OF COMMODORE III, INTERNATIONAL CENTRE, TORONTO, DECEMBER 8-11

Which would you prefer?
$2,145
$2,495
$1,295*
*Prices for the IBM PC and Amiga do not include monitor. IBM PC configuration shown with one floppy drive and 128K RAM, Macintosh configuration with one floppy drive and 128K RAM, Amiga configuration shown with one floppy drive and 256K RAM. Prices may vary depending on dealer.

An Amiga ad from an alternate history

As a result of Commodore dropping the ball on production and marketing, the firm sold only 35,000 Amigas in 1985. This didn't help with the balance sheet, which was getting grim.

Missing CES

Commodore had experienced a financial crunch at the worst possible time. In the six quarters between September 1984 and March 1986, Commodore Business Machines International lost over $300 million.
Money was tight, and the bean-counters were in charge.
As a result, Commodore was a no-show for the January 1986 Consumer Electronics Show (CES). Ahoy! Magazine reflected on this conspicuous absence: Understand that the last four CES shows in a row, dating back to January 1984, Commodore's exhibit had been the focal point of the home computer segment of CES, the most visited computer booth at the show, as befitted the industry's leading hardware manufacturer. Their pulling out of CES seemed like Russia resigning from the Soviet Bloc.

Commodore also missed the following computer dealer exhibition, COMDEX, as well as the June 1986 CES. The company had defaulted on its bank loans and could not get the bankers to lend any more money for trade shows.
The company's advertising also slowed to a trickle. Thomas Rattigan, who was being groomed for the position as Commodore's CEO, recalled those troubling times.

"Basically, the company was living hand to mouth," he said. "When I was there, they weren't doing very much advertising because they couldn't afford it."

This strategic retreat from the market had a hugely negative impact on Amiga sales. In February 1986, Commodore revealed that it was moving between 10,000 and 15,000 Amiga 1000 computers a month. Jack Tramiel's Atari ST was beating the Amiga in sales figures, in signing up dealers, and worse still, in application support.

"They f***** it up"

Many Amiga engineers felt betrayed by Commodore's financial ineptitude and pathetic marketing efforts. They were disgusted that their company could take such an advanced and powerful computer and fail to capitalize on it. Most of these bad feelings were confined to grumblings in the hallways, but some of them wound up hurting the Amiga directly.

One of the software engineers working on upgrades to Workbench, the Amiga's graphical desktop environment, decided he would "get back" at Commodore for its failure to properly market the Amiga. He programmed in a hidden message, commonly known as an "Easter Egg" in the software industry, that would only appear only when the user pressed a certain combination of keys simultaneously. The message was "We made the Amiga, they fucked it up."

RJ Mical got a slight chuckle out of the message, but told the engineer (who remains nameless to this day) that it was unacceptable, and he would have to take it out. The engineer relented, and when Mical checked the final code, the offending text had been replaced with the message "Amiga: born a champion." He thought that was the end of it.

Little did he know that the engineer had added a second Easter Egg with the original message encrypted inside.
To get to the message, you had to hold down eight separate keys, which would pop up the text "We made the Amiga" on the screen. If you kept the keys held down, and were very dexterous or had a friend to help you, inserting a floppy in the drive would flash the latter part of the message for 1/60th of a second.

The engineer thought that nobody would ever see this last part, but because the Amiga could output its graphics directly to video, you could just tape the whole experience and press pause on the VCR to see it.

The message was discovered embedded in the ROMs for the European PAL version of the Amiga 1000, just after the computer had gone on sale in the United Kingdom. Managers at Commodore UK pulled tens of thousands of Amigas off the shelves and refused to sell the machines until replacement ROM chips were sent out that excised the offending message. The little joke by a single software engineer cost the Amiga over three months of sales in a major market and had ramifications that shook the whole company.

Leaving Los Gatos

After the Easter Egg fiasco, Commodore management decided that they should move the Amiga team closer to headquarters so that they could keep a closer eye on their activities. The Amiga engineers were asked to move across the country, from their offices in Los Gatos, California, to West Chester, Pennsylvania.

Many of the engineers shrugged their shoulders and started packing, but for some this was the last straw. RJ Mical, the software guru who had written the Intuition programming interface and designed much of the Amiga's GUI, decided that his future would lie elsewhere. He wound up working as an independent contractor on Amiga peripherals and software, including an early video capture device called a frame grabber.

Despite his issues with Commodore, Mical still was proud of the role he played in developing the Amiga. "Those were such cool days, you just couldn't believe it," he would later tell Commodore documentary author Brian Bagnall. "It was one of the most magical periods of my entire life working at Amiga. God, what an incredible thing we did."

The father of the Amiga, Jay Miner, also refused to switch coasts. While he left Commodore as an official employee, he continued to work as a consultant for them for many years. He also donated much of his time giving talks to Amiga user groups around North America, telling the story of how he brought his dream computer to life.

Searching for stability

The trials and tribulations of Commodore Business Machines International weren't the only problems that dogged the young Amiga computer. The initial release of the operating system was rushed, and as a result the first Amiga 1000 machines shipped with many bugs in the OS. The "Guru Meditation" error that started as a joke in the Amiga offices would come to haunt many early Amiga users.

The infamous Guru meditation error

Because the OS lacked memory protection, a fatal error in the OS or even in an application could lock up the system completely, forcing a reboot.
Users might be taking advantage of the multitasking abilities of the Amiga to run many programs at once, only to lose work in all of them when the machine went down. The PC, Macintosh, and Atari ST, which had much simpler operating systems that could only run one application at a time, did not suffer from this problem.

As a result, the Amiga gained a reputation for instability that would stay with the machine for many years to come. The lack of memory protection wasn't the real problem, an operating system with full memory protection can still be brought down by a bug in the OS itself, and an application that crashes all the time isn't useful even if the OS keeps running. The software engineers at Commodore worked tirelessly to track down these bugs and eliminate them, as did the application developers. Years later, most Amiga users would run many applications at once and keep their machines operating for weeks and even months without crashing or requiring a reboot. However, the initial stability problems hurt the reputation of the Amiga, and it carried this reputation for the rest of its life.

Rattigan takes the reins

What had seemed like such a promising start for the Amiga Computer had turned, at least early on, into something resembling a disaster. Yet all was not lost. There was still hope that the problems that plagued the platform and its owner could be addressed, and the Amiga given a chance to thrive. Doing so, however, would necessitate a change in Commodore management.
The company, which had been thrown into such disarray when founder Jack Tramiel was unceremoniously booted out by the jet-setting financier Irving Gould, was currently being run by an uninspiring man named Marshall Smith. Smith had come from the steel industry, where nothing much changes across decades, and was thoroughly unprepared for the task of running a computer company.

An indication of what kind of man Marshall Smith was came at Commodore's 1985 Christmas party held at the Sunnybrook Ballroom in Pottstown, Pennsylvania. Drinking heavily, Smith started slam-dancing with a bunch of the engineers, including Greg Berlin, Bil Herd, and Bob Russell. For some reason, unknown to anyone but Smith, he playfully slapped Herd in the face.
Herd, who had also been drinking, replied with a slap of his own, but his right hand was in a plaster cast and his slap carried significantly more impact. As Smith staggered back under the weight of the blow, Herd simply said "Don't do that again." Smith said nothing, and Herd was never disciplined for hitting his boss. "Drinking and slam-dancing, that's about the only thing I think [Smith] was qualified to do," recalled Russell.

The Commodore laptop that never was
Image courtesy old-computers.com

Smith certainly wasn't a good businessman. At the January 1985 CES, Commodore had shown off an innovative portable computer using an LCD screen. The laptop computer had a display that could show 16 lines of 80-column text, which compared favorably to the then-popular Tandy Model 100's 8 lines and 30 columns. Commodore took orders for 15,000 units of the machine just at the show itself, and it looked like it would be a smash success.

That was when the CEO of Tandy/Radio Shack took Marshall Smith aside and told him that there was no money in LCD computers. Smith not only canceled the machine, but sold off Commodore's entire LCD development and manufacturing division, based solely on this dubious "advice" from his competition! Commodore had a chance to take an early lead in the emerging market of portable computers. Instead, the company would never produce a laptop again.

The man intended to replace Marshall Smith was Thomas Rattigan, an executive from Pepsi who had once worked with then-Apple CEO John Sculley. Like Sculley, he knew little about computers when he arrived at his new company, but he was a good listener and learned quickly. In late 1985, Rattigan was given the title of Chief Operating Officer (COO), reporting to Marshall Smith. Smith continued to bungle almost everything, and finally in February 1986 he was let go and Rattigan became President and CEO of Commodore International. He was given a five-year contract that was set to expire on July 1, 1991.

At last Rattigan could take on the task of righting the sinking ship that was Commodore. He had an ambitious plan that involved tackling every problem that plagued the beleaguered computer company. Firstly, to stop the bleeding and restore the company to profitability, he would cancel irrelevant projects, sell off unimportant divisions, and be brutal about laying off employees.

Secondly, he would push for a redesigned and cost-reduced Amiga that could be sold at a lower price and allow Commodore to reenter the home consumer market that it once dominated with the C-64. Lastly, he would make a serious attempt to capture the more profitable high-end market by making a new Amiga that was more powerful and expandable than the 1000.

Rattigan would end up succeeding in every part of his plan. He would bring Commodore back from the brink of bankruptcy and back into profitability. He would reinvigorate the Amiga platform by splitting it into low-end and high-end models, each with different market possibilities. He would even preside over a new set of advertisements that, for the first time, properly showcased the power of the Amiga.

For all this effort, which Rattigan would achieve in a little under a year and half, he would be rewarded not with a pay raise, a promotion, or even a pat on the back. Instead, Rattigan would be kicked to the curb, fired before he had even run out his contract. In his place would come vampires, creatures dedicated not to the success of Commodore or the Amiga, but in sucking them both dry until they turned into dust.

A history of the Amiga, part 6: Stopping the bleeding

Chopping heads

When a corporation is bleeding money, often the only way to save it is to drastically lower fixed expenses by firing staff. Commodore had lost over $300 million between September 1985 and March 1986, and over $21 million in March alone. Commodore's new CEO, Thomas Rattigan, was determined to stop the bleeding. Rattigan began three separate rounds of layoffs. The first to go were the layabouts, people who hadn't proven their worth to the company and were never likely to. The second round coincided with the cancellation of many internal projects. The last round was necessary for the company to regain profitability, but affected many good people and ultimately may have hurt the company in the long run. Engineer Dave Haynie recalled that the first round was actually a good thing, the second was of debatable value, and the last was "hitting bone."

Under Jack Tramiel, Commodore had embarked on a whole host of projects: some practical, some far-sighted and visionary, and others just plain crazy.

To try and figure out which was which, Rattigan looked for an experienced opinion. He found one in Charles Winterble, a former Commodore engineer turned consultant who at the time was still under the lawsuit Commodore had going against Atari!

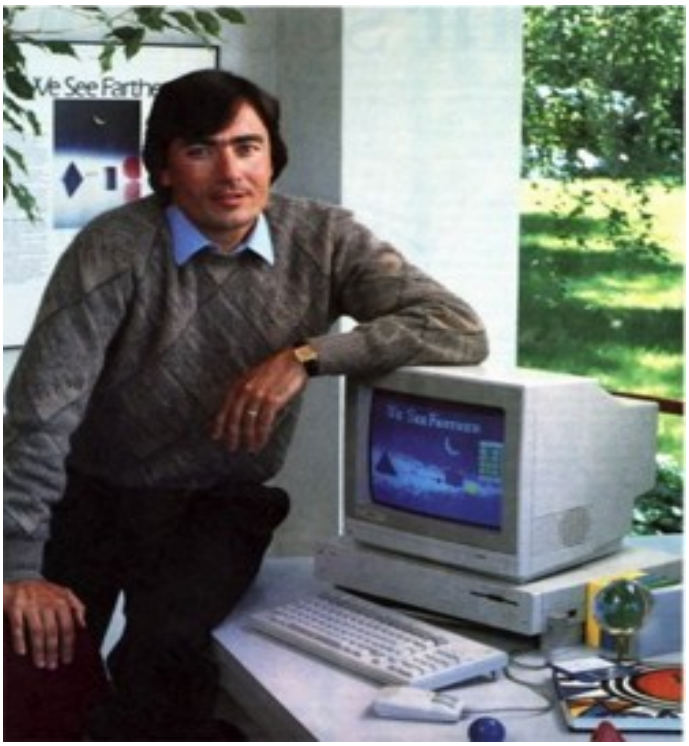
First to the chopping block were Commodore's aging line of PET computers, which had been the first fully-assembled computers to hit the market (they predated both the Apple][and TRS-80). The VIC-20, once promoted by William Shatner, was also axed. Next up were the innovative but ultimately pointless collection of small 8-bit computers that were incompatible with the blockbuster C-64: the Plus/4 and Commodore 16, and various other machines that had never left the prototype stage. The Commodore 900, an innovative Unix workstation with a 1024 by 800 bitmapped display, was also canceled.

How many megabytes does that cabinet hold?

Computers weren't the only thing that Tramiel had a hand in. At the time, the company still owned an office supply manufacturing firm in Canada. I personally ran into Commodore-branded filing cabinets far more often than I ever ran into Amigas. Rattigan got rid of these and other distractions.

Rattigan also cleaned up the sloppy accounting processes that had been allowed to fester under his predecessor, Marshall Smith. Three redundant manufacturing plants were closed, and new financial controls were put into place to keep a tight check on spending. In all, the cuts did their job.

Commodore paid off their debts and even posted a modest $22 million profit in the last quarter of 1986. In the meantime, the Amiga still needed applications if it was to become anything more than a curiosity. One of the first companies to publicly pledge support for the platform was none other than Electronic Arts.



Electronic Arts and Deluxe Paint/EA founder
Trip Hawkins poses with an Amiga 1000

Those who have firsthand experience with the modern Electronic Arts typically know it as a faceless corporate behemoth, infamous for absorbing, then strangling independent development teams, eliminating competition by paying for exclusive rights to major sports leagues, and working its employees beyond the breaking point. They may be surprised to find out that EA originally had quite a different mission and philosophy.

EA's founder, Trip Hawkins, was actually fighting against the poor treatment of programmers that he witnessed elsewhere in the industry. When he launched Electronic Arts in 1982, he envisioned an environment where developers and game designers would be treated like rock stars: promoted in major media, given generous royalties, and allowed to explore wherever their imagination and talent led them.

Hawkins saw the Amiga as a groundbreaking platform, a brand new canvas that would let his developers create great new works of art. In November 1985, he took out a two-page ad in Compute! magazine that extolled the Amiga's virtues and promised that Electronic Arts would be supporting the platform for a whole new generation of games. "I believe this machine, marketed and supported properly, should have a very significant impact on the personal computer industry," Hawkins said prophetically in an earlier interview in the same magazine.

EA's first Amiga product, however, wasn't a game at all, but a game development tool. Programmer Dan Silva had been working on an internal graphics editor that was code-named Prism. When the Amiga was released, he quickly reworked the program to take advantage of the new computer's stunning graphics capabilities. Even before it shipped, Silva was already working on the next version, which would contain many more advanced features.

This program was Deluxe Paint, and it launched the careers of thousands of computer graphic artists. With a simple interface featuring a toolbar on the right-hand side of the screen, Deluxe Paint was a powerful tool that could create not only static graphics, but also animation. This made it perfect for creating images for computer and video games, and for a long time Deluxe Paint was the industry standard for creating art for this medium, much like tools such as 3D Studio Max are today.

Even years later, as the PC gaming market began to eclipse the Amiga in terms of sheer size and number of titles, many game development studios still made their art using Deluxe Paint. Its native format, IFF, and animation format, IFF ANIM, are still supported by many graphics packages today. IFF ANIM files were compressed using delta encoding, resulting in smaller files. This was nearly 10 years before animation compression standards such as MPEG were released.

But back in 1986, the combination of an Amiga and Deluxe Paint was unbeatable. While Adobe's Photoshop on the Macintosh platform would eventually become the standard tool for creating two-dimensional graphic images, the Mac was still a monochrome-only computer at this point, and the PC could barely manage four colors even with a CGA graphics card. Again, the Amiga was ahead of its time.

The cover art for the Deluxe Paint II box featured an image of Tutankhamen that had been created inside the program itself. This image quickly became an iconic picture in the computer graphics industry.
Even Commodore recognized the power of Deluxe Paint, using the Tutankhamen image on a new full-page ad that (finally!) stated the Amiga's advantages outright.

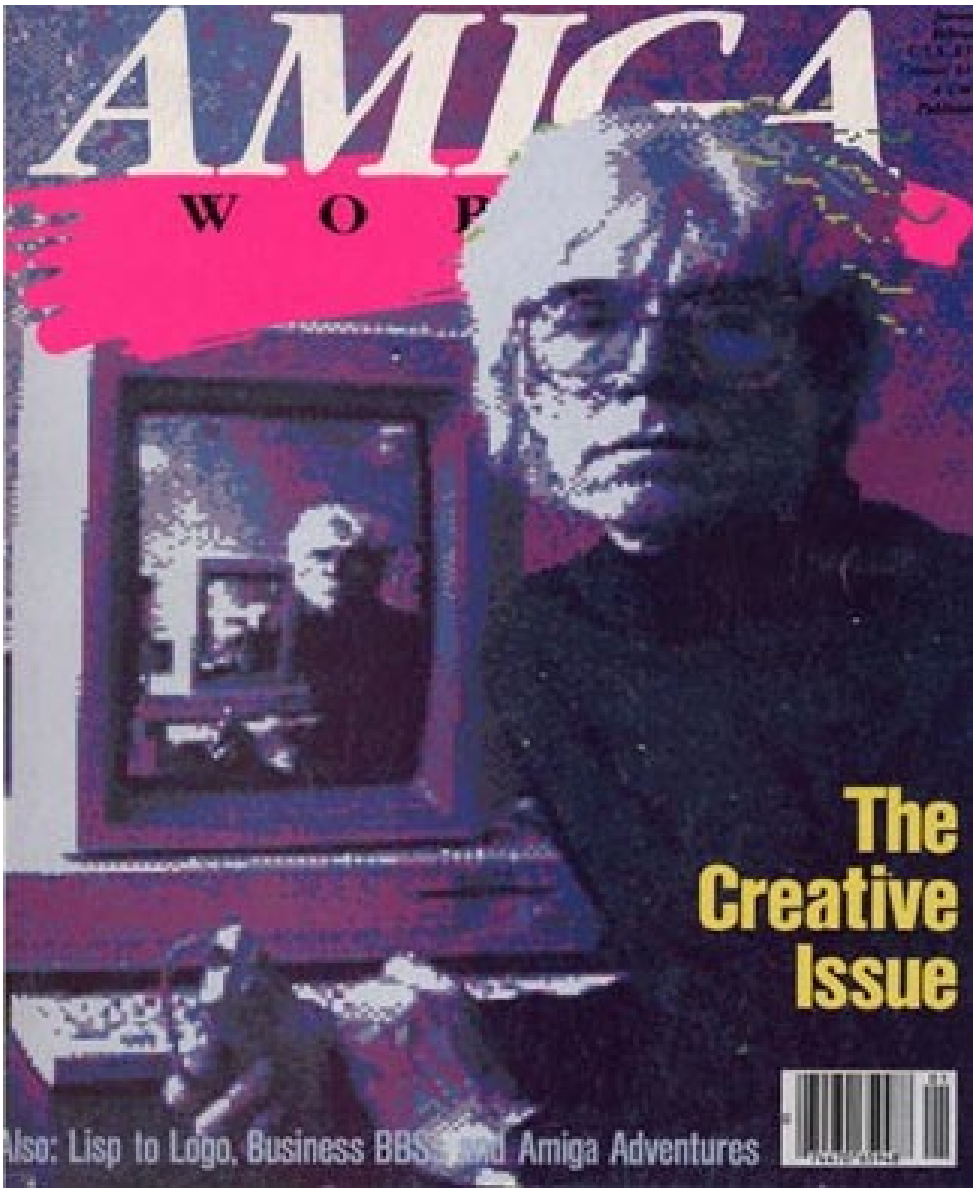
Color
Amiga under $2,000.
Anybody else
up to $20,000.
This "painting" was created on the Amiga™ computer using Electronic Arts' Deluxe Paint™ software. No PC, anywhere, can create this kind of graphic dazzle for the price of an Amiga.
But there's more to the Amiga than whiz bang graphics. It's also a top-of-the-line PC ready to solve problems, business and personal.
The incredible power that brings Tut back to life can also make gigantic spreadsheets sit up and beg, can make eloquent the wordiest of word-processing tasks, and thanks to the Amiga's unique multitasking capabilities, it can do
word processing and spreadsheet analysis and graphics and more simultaneously.
No other PC past, present or in the near future has done it, is doing it or is likely to do it.
AMIGA
See what you think.
™Amiga is a trademark of Commodore-Amiga, Inc. ™Deluxe Paint is a trademark of Electronic Arts, Inc.
©1986, Commodore Electronics Limited

.Commodore Amiga ad, circa 1986.
Image courtesy The Commodore Billboard

Magazines

Around this time, the first print magazines covering the Amiga platform were starting to appear. The first such magazine was called Amiga World, started by publisher IDG. The premiere issue of the bimonthly magazine reached store shelves in late 1985, and featured the new Amiga 1000 on the cover.

For the second issue, Amiga World tracked down Andy Warhol, who had been one of the stars of the Amiga unveiling. Warhol was an enigmatic personality who ran a magazine called Interview, yet refused to give interviews himself. After brusquely turning down the Amiga World reporter's request for an interview, Warhol retreated to his office upstairs. The undaunted reporter followed Warhol into his office, and while the iconic artist began painting pictures on his Amiga 1000, the journalist started asking him questions anyway.



Andy Warhol on the cover of Amiga World
Image courtesy Amiga History Guide

"Do you like the Amiga? What do you like about it?" the reporter asked.
"I love it. I like it because it looks like my work."
"Do you think it will push the artists?"
¨That's the best part about it. I guess you can... An artist can really do the whole thing. Actually, he can make a film with everything on it, music and sound and art... everything."
"Why haven't you used computers before?"
"Oh, I don't know, MIT called me for about ten years or so, but I just never went up... maybe it was Yale."
"You just never thought it was interesting enough?"
"Oh no, I did, uh, it's just that, well, this one was so much more advanced than the others."

Warhol was a genius at self-promotion, but his "interview" showed genuine enthusiasm for the Amiga computer. He expressed frustration at not having a color printer yet and talked about how cool it would be to have a graphics tablet and stylus to replace the mouse. These products were all in development, but Warhol wanted them now.
Celebrity endorsements were hardly new in the computer field, but here was something different: a celebrity artist who was a genuine user and enthusiast for the platform. Here was a market, albeit a small one, that could potentially be nurtured.

Repositioning the Amiga

Commodore marketing had positioned the Amiga 1000 as a business machine to compete directly with the IBM PC and its countless clones. This was probably not the best idea.

The average businessman is, let's face it, slow, stodgy, and a bit boring. They are often the last to adopt any new technology unless it can make a clear case for increasing the bottom line. A computer that could print dynamic 3D charts and graphs in color was not going to be useful to a businessman unless there was a whole supporting infrastructure around it: color printers, color overhead display panels, business presentation software, and so forth. This was not the case in 1986.

Thomas Rattigan didn't believe that the business market was the best place to try and sell the Amiga. "I think the price confused a lot of people," he said in a 1987 interview. "People seem to think that home systems are under $1,000 and business systems are over $1,000. I don't think the higher-end Amiga is going to go into accounting departments, but I do think it is going to go into areas where there is a degree of creativity, if you will." In this prediction Rattigan was bang-on. Rattigan believed that the best strategy was to split the Amiga 1000 into two products: a low-end model to take on the huge home market that had been dominated by the Commodore 64, and a high-end computer that would appeal to graphic artists, like Andy Warhol, who were interested in expanding their system.

The low-end: The Amiga 500

The Commodore CEO wasn't the first one to make the case for a cheaper Amiga. Hardware engineer George Robbins felt that a lower-end Amiga was a better idea right from the start, and Bob Russell said he had been fighting for such a product before the Amiga 1000 was even released. Still, it took someone higher up in the managementchain to make the new machine, dubbed the Amiga 500, a reality. Rattigan had to choose between the remnants of the original Los Gatos crew who had designed the Amiga 1000 and Commodore's core group of engineers in West Chester, Pennsylvania. He chose the latter group because he felt they would be "more bloodthirsty" and thus likely to deliver the machine faster.

He assigned Jeff Porter, the engineer who had developed the innovative (but canceled by Rattigan's predecessor) LCD computer, to be the director of new product development. The lead engineers for the 500 were George Robbins and Bob Welland, who had previously worked on the also-canceled Commodore 900 Unix workstation. They were an odd bunch to be tasked with coming up with the computer that had to save the company, but in many respects they echoed the rogue team of misfits that had come up with the Amiga in the first place. George Robbins, a gentle and kind man with long hair and a walrus mustache, practically lived at work and often forgot to do his laundry. His coworkers, who loved Robbins, but worried about his personal hygiene, would constantly buy him new shirts to wear and quietly dispose of the old ones.

The Amiga 500

Robbins needed to avoid the distraction of laundry duties, as he was intensely focused on cutting costs on the Amiga. Welland was the ideas man, while Robbins was the practical engineer who could take great ideas and turn them into working electronics. One of the ideas Welland had was to increase the RAM on the "Agnes" custom chip to 1MB so that the Amiga could support higher graphics resolutions. The original Los Gatos team was a bit miffed at the proposed changes to their design, which they felt were not revolutionary enough, and made it known that they didn't think the changes would work. This motivated the Amiga 500 team even harder.

"Fat Agnes" did end up working, and the original Amiga engineers admitted that the design was probably a good idea. The modest change increased the Amiga's capabilities while also keeping a high level of backwards compatibility with existing software. "It was a step in the right direction, but it violated the [original] idea of the bus architecture and actually slowed the machine down," RJ Mical said later.

Meanwhile, the pragmatic Robbins was finding ways to redesign the Amiga's motherboard to reduce costs. He took out the ability to connect directly to a television set and replaced it with a separate adapter, the A520. This turned out to be a good idea because most users weren't using a TV set anyway, the fuzzy image quality of TV sets caused text to "bleed" and made it hard to read. He took the power supply out of the main machine and integrated the keyboard into the case, which was inspired by the design of the Commodore 128. The 3.5 inch floppy drive was fitted in on the right-hand side of the machine. A thin expansion slot was placed on the other side. Devices could be plugged into this slot directly without removing the Amiga's case.

The high-end: The Amiga 2000

While the 500 project continued, Commodore needed people to work on the high-end Amiga 2000 design. Unfortunately, Rattigan's massive personnel cuts had left few engineers available for the project. The task was farmed off to Commodore's German subsidiary, but the engineers there simply took the original Amiga 1000 design, added a hardware interface for adding expansion cards, and put the whole thing in a standard PC desktop case. This wasn't quite what Rattigan was looking for.

The task of redesigning the Amiga 2000 fell on one Dave Haynie, whose broad shoulders and ever-broadening ego were large enough to carry this burden. "I was the design team for the A2000," Haynie said. "That's kind of the way things were there because we had a lot of layoffs. I was working day and night and there still wasn't enough time to do everything." Haynie would work through the week, then let off steam on Friday by retiring to Margaritas, a local dive where the beer was cheap and plentiful.

Haynie was inspired by the designs made by the Los Gatos team and determined to improve on their elegant architecture. He designed a new custom chip, called Buster, to handle the expansion bus. The bus design, which was called "Zorro" in reference to one of the original Amiga prototypes, was also ahead of its time. Unlike the ISA slots in the IBM PC, the Zorro slots had "autoconfig" built-in and would allow expansion cards to be work instantly without any manual configuration of jumpers or resolving device conflicts.

Built like a tank: the Amiga 2000

Haynie wanted to design a machine that would be easy, for both end users and Commodore itself, to upgrade to more powerful processors that were coming out of Motorola's design labs. He put the CPU on a separate board that could be swapped out later. From the German designers he got the idea of a genlock, a way to directly output computer images on top of video with no loss of image stability. He turned this idea into a separate dedicated video slot, which could be fitted with a genlock card or other types of video processing cards. This idea would later turn the Amiga, already a multimedia powerhouse, into the standard computer for the video industry.

The Amiga 2000 would have unprecedented expandability, with five open Amiga Zorro expansion slots, four IBM PC ISA slots, and the aforementioned CPU and video slots. This was to be a serious machine, for serious users. The case was recycled from the canceled Commodore 900 workstation project. Not everybody liked the idea of the 2000. Amiga creator Jay Miner, when asked about the machine at an Amiga user group meeting, recommended that Amiga 1000 owners hang on to their existing computer instead of upgrading. Jay's feelings weren't all about sour grapes. He felt that the computer had not been improved enough, given the advances in technology that had occurred since he first started designing the original Amiga back in 1982.

Rattigan's fall

Jay Miner had a point. Time had been passing swiftly since the Amiga launch in 1985, and he wasn't the only one getting frustrated. Irving Gould, the enigmatic financier who controlled Commodore at a distance, started voicing concerns that the Amiga 500 and 2000 were taking too long to arrive. Gould, like many bosses before and after, was asking for the impossible. Making Commodore profitable was the first priority, and Rattigan had done that by slashing the payroll. Creating a more popular successor to the Amiga 1000 was the next priority, and the few remaining engineers were doing what they could with very limited resources.

The Amiga 500 and 2000 delays weren't the only fault that Gould could find with Rattigan. He accused his CEO of behaving "in a high-profile manner" in an interview with the Philadelphia Inquirer, a spurious charge if there ever was one. Rattigan's "high profile" consisted of doing a couple of magazine interviews. In one of these, the reporter asked him how he felt about being so little-known compared to other computer industry CEOs like John Sculley at Apple. He replied that he didn't think it was important to be well-known when your company was losing money.

Rattigan knew that he could not win in a battle with Gould, who owned six million of Commodore's 30 million shares. For his part, Gould was a slippery opponent. He rarely came into the Commodore offices, preferring to spend his time phoning various employees, trying to dig up dirt on his own CEO.

Irving Gould
Image courtesy commodore.caIn

April 1987, Gould hired the management consulting firm Dillon-Read to prepare a report on Commodore. Consulting firms have a long and inglorious history of charging outrageous fees just to have their junior-level employees issue urgent recommendations for more consulting, all billed by the hour. This particular firm was no different, but the Dillon-Read consultant who prepared the report had an even less altruistic purpose in mind.

His name was Mehdi Ali, and legions of Commodore employees and Amiga owners would one day learn to rue his name.

The report suggested that Rattigan be immediately replaced, something Gould was more than happy to carry out. He called a board meeting, specifically excluding his CEO from attending.

Rattigan knew that the game was up, but decided to stick it out to the end, and showed up for work the next morning.

The guards had been ordered not to let him on the premises, but pretended that they hadn't heard these instructions. "What the hell am I going to do?" one of them said. "The guy is running the company and turned it around, and I'm going to stop him from entering? Are you crazy?"

The locks on his office door had been changed. Rattigan was met in the hallway by an army of lawyers, who informed him that he was no longer employed at Commodore. He asked what the basis was for his termination, but the lawyers could give him nothing but meaningless gibberish. Resigned to his fate, Rattigan allowed himself to be escorted out of the office. Standing in the parking lot, he took a look back at the company that he had saved, and wondered where it had all gone wrong.

Gould had won, but it was a pyrrhic victory at best. He had lost the best CEO he ever had, and worse still, had broken a legally binding contract to do so. Rattigan sued for breach of contract and $9 million of unpaid wages. Commodore immediately countersued for $24 million. The case wasn't settled until 1991, which was ironically the expiry date of Rattigan's original five-year contract. Rattigan won, and Commodore's countersuit was dismissed.

The Amiga strikes back

So what had Rattigan accomplished? He had stopped the bleeding, made Commodore profitable, and made possible the projects that would bring the Amiga into its golden age: the A500 and A2000. Both models were released within a couple of months of Rattigan's termination.

What the Amiga could have done had Rattigan been allowed to stay is another of the many "what if" stories that pepper the Amiga tale, but it is what he did while he was there that mattered. By saving Commodore, he allowed the Amiga to survive, and in its new high-end and low-end forms it would find sales successes that the Amiga 1000 could only dream of.

And because of these new models, the story of the Amiga split also. No longer was it just about the original creators, or the struggles of a company trying to introduce a revolutionary new technology. From now on, the Amiga tale would be about its users: a diverse group of people who found the platform in different ways and took it in different directions.

Amiga was now about the gamers, about the bulletin board users, about the demo coders, about the hackers, and about the graphic artists, the animators, and the movie and television creators. It was now about the Amigans.

A history of the Amiga, part 7: Game on!

The most powerful gaming platform

The Amiga started out its life as a dedicated games machine, and even though it grew into a full computer very quickly, it never lost its gaming side. The machine's 4096-color palette, stereo sampled sound, and graphics acceleration chips made it a perfect gaming platform, and it didn't take long for game companies to start taking advantage of this power.

While the slow sales of the Amiga 1000 limited the number of games that developers were willing to make for the platform, when Commodore released the low-cost Amiga 500 in 1987, everything changed. Now the most powerful gaming computer was also one of the cheapest, and game companies jumped at the chance to showcase their talents on the Amiga.

Mind Walker (1986)

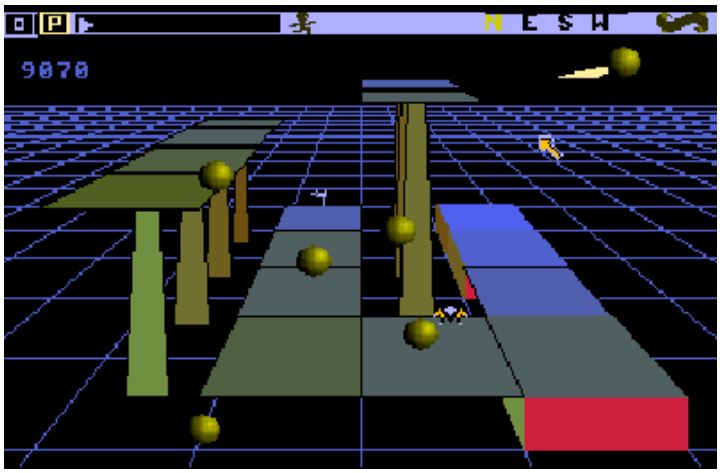
One of the first games ever released for the Amiga was a quirky gem called Mind Walker, written by Bill Williams and published by Commodore itself. Williams started his game design career on the Atari 800, writing classics like Necromancer and Alley Cat. His games were always unique, combining off-the-wall situations with innovative game play.

Mind Walker puts the gamer in the role of a physicist who has lost his mind. Instead of resorting to drugs or therapy, the protagonist of the game decided to send his split ego into the depths of his own brain. Your job is to navigate this surreal landscape and uncover paths leading to deeper and deeper levels, with the ultimate goal of finding the hidden key to save your sanity.

Your alter ego jumps around on brightly colored square platforms of varying height—fortunately, you can't fall off. If you reach the end of the screen it instantly loads the adjacent area.

Floating gold balls try to zap you with deadly searchlights, but you can zap most of them with bolts of electricity that you direct with the deft skill of a Sith Lord.
Over some squares hover strange pyramids that transform your avatar from a man into a red wizard, a flying bug-like alien, or a sexy seductress.

Different forms are required to find different parts of the path, and keeping track of the whole operation requires careful consultation of the overhead map. If the character becomes hidden behind an overly-tall platform, the player can switch to one of four different views by hitting the letters N, S, E or W.



Mindwalker by Commodore

Once the path is complete, the game shifts to a three-dimensional view of a psychedelic tunnel. The player has to grab a translucent green door with his disembodied hands, which leads to the final level in which the character fends off fuzzy-looking "bad thoughts" to find the next piece of his sanity.

The game has simple but evocative graphics that make good use of the Amiga's built-in hardware polygon drawing and area fills. Bill Williams had been a composer before he became a game designer, and the music he created for Mind Walker has an eerie, lyrical quality to it that fits perfectly with the game's theme. The game uses stereo pan effects to let the lightning bolts seem to sear across the room. Like the Amiga itself, Mind Walker was unusual and thought-provoking.

Another unusual thing about the game was that it not only fit neatly on a single floppy disk, but it also had no copy protection and could be run directly from the Amiga's Workbench GUI. Furthermore, the game was multitasking-friendly, so you could easily run other applications in the background. Few Amiga games in the future would retain these qualities. Game developers, eager to squeeze out every last bit of power from the computer, would bypass the operating system and access the hardware directly. This allowed later titles to be much more graphically impressive, but at the cost of multitasking capabilities.

Bill Williams would continue writing games up until 1992, when corporate interference on the Super Nintendo title Bart's Nightmare (he referred to it as "Bill's Nightmare") caused him to leave the industry altogether and pursue a second career as a Lutheran pastor, picking up a master's degree in theology along the way.

Defender of the Crown (1986)

Cinemaware was started by Robert and Phyllis Jacob in 1985. Their goal was to create games that had style and presentation that were evocative of movies. This was an ambitious goal back when most video games were simple shoot-em-up or maze-chasing affairs, but the advent of the Amiga gave the small company a chance to realize their dreams.

Defender of the Crown was their first title, and it showcased the power of the new platform. The scene: you are a Saxon baron of an English fiefdom in the Middle Ages, and the king has just been killed without a clear successor. You must fight other Saxons and Norman invaders to conquer England and become the new king.

The game was one of the first to feature gorgeous hand-painted loading screens to set up the action, and the game itself was just as beautiful. Each turn begins with a stylized birds-eye view of Britain. From this menu, the player can choose to attack a neighboring county, stage a raid on an enemy castle, stage a jousting tournament, or occasionally stage a daring rescue of a beautiful maiden. Robin Hood pops up from time to time as a non-player character who can be either an enemy or an ally.

Defender of the Crown by Cinemaware

As in many games of its era, winning can be frustratingly difficult. In the raid screen, for example, you control a single fighter who must cut down enemy after enemy while his compatriots merely keep the rest of them away. Jousting is only slightly less difficult than the real thing, requiring a steady hand on the mouse to position your lance in the right position at the right moment. Winning a joust can gain your side honor points or even territory, depending on the initial stakes.

Defender of the Crown was an Amiga-only game at the outset, and was often used by dealers to showcase the platform to eager young gamers. Much of the credit for the game's success has to go to the game's artist, Jim Sachs. RJ Mical, who did some consulting work for the game, recalled his talent.

"Jim Sachs, what a god he is," marveled Mical. "Jim Sachs is amazing. These days everyone sees graphics like that because there are a lot of really good computer graphics artists now, but back then, 20 years ago, it was astonishing to have someone that good."

Because Cinemaware was a startup company running low on cash, and Defender was the first product, it was forced to release the game before it was completely finished. Later, ports of the game to the Nintendo Entertainment System, Commodore 64, IBM PC, and the Atari ST would fill out the missing parts, including a more substantial army attacking screen. The ports could not deliver the same sound and graphics quality of the Amiga version, however.

Cinemaware continued to publish innovative games until 1991, when over-extension and feature creep on the Cold War title SSI caused the company to declare bankruptcy. Two early employees of the company, Lars Fuhrken-Batista and Sean Vesce, got back together to create an updated version of the game called Robin Hood: Defender of the Crown for the PlayStation 2, Xbox, and Windows PCs in 2003.

FaeryTale (1988)

Faery Tale is one of those games that everyone who played it remembers. An fantasy role-playing game by MicroIllusions that featured a top-down view, Faery Tale resembles classics like the original Legend of Zelda and the Ultima series, and contains a surprising amount of depth.

The game starts out by introducing the main characters via a virtual story book that slowly flips its pages. Three brothers, Julian, Philip, and Kevin have grown up in the small hamlet of Tambry in the land of Holm and are eager to explore the wider world. Julian, the bravest of the three, sets out first. The world, as in many RPGs, is inexplicably full of bandits, monsters, and undead creatures like skeletons. They often attack in groups that can easily overwhelm the player's character, especially with his initial armament of a small dagger. The action takes place in real-time, without turns or pauses, and surviving the game's early stages can be difficult.
If Julian dies, a small fairy will resurrect him, but after a number of deaths he becomes a ghost. The player is now transferred to Philip, who can talk to Julian's ghost and recover items from his body. If Philip fails, the quest is taken up by Kevin, who is the player's last hope. Fortunately, the game can be saved at any time.

Faery Tale Adventure by MicroIllusions

Characters have various statistics that can be improved with time and training, as in many RPGs. Bravery reflects the player's strength, and Vitality his hit points (which go up at a slower pace as Bravery rises). There are also Kindness points that are required to talk with certain non-player characters. Unlike many role-playing games, Faery Tale lets the player attack innocent non-player characters, although because they then stay dead this is rarely a good idea. The player must also make sure he has packed enough food for his long journey, as hunger will slowly drain his Vitality.

Objects on the ground can be picked up, and treasure obtained can be traded in for better weapons at the local shop. When the weapon is equipped, it is immediately visible on the player's character. Some items are magical, such as the Bird Totem that gives the player a birds-eye view of the map. There are colored keys to open certain locked doors, potions to restore health, and even trinkets to momentarily stop time in the heat of battle.

The game world is staggeringly large, and contains many surprises and twists, such as a giant turtle that the player can use to transport himself across the water. Later, to save the king's daughter from a horrible fate, the player must tame and fly a golden swan across an otherwise-impassable mountain range.

Despite having a fairly pedestrian fantasy plot (the player must accumulate five golden statues in order to open a portal to the Astral World and defeat the evil Necromancer) the game is still memorable more than twenty years later.

I talked to my friend Domenico DiTomaso, and he recalled spending two happy months playing cooperatively with a friend to complete the game. "You could go anywhere," he said, marveling at the free-form game play that allowed the player to wander through the entire world without hitting a loading screen. "Just remember," he told me, "make sure you make a map when you enter the Dragon's Cave!"

Dungeon Master (1988)

Dungeon Master actually made its debut on the hated Atari ST platform a year before it was released for the Amiga. Because of this, the graphic quality was somewhat less than the Amiga was capable of producing, but the 3D first-person view made this dungeon crawl stand out from its competition. Although the graphics were largely unchanged in the port, the Amiga version did make good use of the custom sound chips. The stereo sound made monster noises seem to "pop out" in three dimensions, an important clue when enemies could sneak up on the player from all directions. This advantage actually helped to sell Amiga 500s over Atari STs.

Dungeon Master was inspired by the crude three-dimensional graphics found on the Ultima series of games whenever the player entered a dungeon. By placing the entire game in that setting, the designers at FTL Games could concentrate on improving the 3D graphics and game play experience.

The game started out at the entrance to the dungeon, with only one direction of movement possible: go inside! In the first level, the disembodied player wandered around a "Hall of Champions" consisting of many different portraits of heroes hanging on the walls. Moving up close to a portrait caused the character to magically appear as part of your party: you could have up to four characters in total. Unlike other dungeon crawls, there was no other character creation process: you took the pre-defined adventurers as they were. When you were ready, you took the stairs down...

Dungeon Master by FTL

All the action could be controlled with the mouse, from turning and moving to picking up objects. Clicking on an object moved it into an empty hand of the currently-selected character, you had to open an inventory screen to move the object into a backpack. Excess inventory could be thrown with the right mouse button, and it would sail forward across the dungeon. There were many puzzles, hidden levers, and secret doors to unlock.

Clues could sometimes be found in notes that were scattered around the top levels of the dungeon.

Combat took place in real-time, with the player required to manually switch between characters to take a swing or cast a spell at a monster. The spell casting system was quite innovative: for example, to cast a fireball, the player mixed a fire symbol with a wing symbol. If one of your characters died (this happened to me early on when falling through a trap door) you could pick up their bones and carry them around to a rebirth chamber.

There were 14 levels in total in Dungeon Master, and completing the last level involved slaying a demon master named Chaos, who looked like a cross between Darth Vader and Amadeus. Chaos could not be killed with normal weapons, and had to be trapped in a magical cage before he could be dispatched. There was a plot line hinted at in the game, and detailed in the manual, which was written by Nancy Holder, a novelist who has since written books for Buffy the Vampire Slayer, Sabrina, the Teenage Witch, and Smallville.

Dungeon Master inspired a ream of copycats, such as Eye of the Beholder and Captive. It was the primary inspiration for the groundbreaking 3D masterpiece Ultima Underworld.

Xenon II (1989)

Xenon II was a sequel to the popular, vertical-scrolling shoot-em-up game written by a company of Amiga fans called The Bitmap Brothers. Sequels were good to the Bitmap Brothers; the company's second version of its futuristic arena handball game Speedball was a huge commercial success and is remembered fondly to this day.

Before the advent of 3D shooters, one of the most popular types of game was the 2D scrolling shoot-em-up, a game usually set in space where the player controlled a single ship that was pitted against an endless fleet of oncoming enemy craft who couldn't shoot very quickly. The first arcade games had limited processing power and usually set the player against a simple backdrop of stars. Later games had more detailed backgrounds that could become obstacles all by themselves.

Xenon II's backgrounds and enemies were largely inspired by the arcade megahit R-Type, which set the player against a strange and somewhat disgusting array of space-faring worms and other ugly-looking creatures. Xenon II had space worms and giant space trilobites to go along with the more standard-looking enemy space ships. Unlike R-Type, which scrolled from right to left, Xenon II kept the scrolling old-school and vertical. One difference: the player could scroll backwards for a short distance in a pinch.

At the end of each level, the player had the opportunity to visit a shop, tended by a cranky old alien. He would give some advice about each power-up available for purchase, but if you pestered him for too long, he would snark back: "What, do you want me to play the game for you too?"

Xenon II by The Bitmap Brothers

Xenon II didn't contain any brilliant innovations or redefine the 2D scrolling shooter genre, but it did show that the Amiga was capable of delivering arcade-like experiences at home.

Shadow of the Beast (1989)

While most of the Amiga games up until this time had been superior to ports on other computers, there still wasn't a game that conclusively blew away the competition and left no doubt about which was the superior game platform.

That is, until Psygnosis released Shadow of the Beast. A side-scrolling platform game in the vein of Super Mario Bros., Shadow of the Beast pushed the Amiga graphics chipset to its limits.

Back before 3D graphics technology, side-scrollers would often use a technique called parallax scrolling, where images in the background scrolled more slowly than those in the foreground to give the illusion of movement in a large world. Few consoles at the time had the power to scroll backgrounds at all (Super Mario had static backgrounds) but some arcade games would have two or maybe three levels of parallax scrolling. Shadow of the Beast had up to twelve. The enemies were no slouches either. Unlike the tiny sprites of other side-scrollers, monsters in Shadow of the Beast could fill up to half the screen.

Shadow of the Beast had an intriguing back-story. The game's protagonist was a man named Aabron who was kidnapped as a child by the evil beast lord Maletoth, and twisted through evil magic into a horrific man-beast to serve his new master. When this creature witnesses a man being executed, he remembers the man as his human father and his childhood memories come flooding back to him. Escaping from Maletoth, he is determined to seek his revenge.

Shadow of the Beast by Psygnosis

Finishing the game's 12 levels was a frustratingly difficult task. The Beast, while powerful in his own right, seemed to be constantly on the edge of death. Not only were there other monsters to deal with, but the Beast also faced an endless barrage of deadly spike traps that rose from the ground, flying squadrons of spiked balls, and even giant floating eyes. The Beast started with 12 units of health, and each touch of an enemy would reduce his reserve by one. If it fell to zero, the game was over.

The graphics weren't the only part of the game that stood out. "What I remember foremost about Shadow of the Beast is the music," said Amiga owner Narendar Ghangas. "The game had a foreboding sense of atmosphere throughout and the moody strings really suited the dark nature of the game. I remember being totally captivated by the synthesized music—it was haunting."

While some panned Shadow of the Beast for putting graphical eye-candy over depth of game play, the game itself was a commercial success, and was later ported to platforms such as the Sega Genesis (minus much of the color palette and several layers of parallax scrolling). It also spawned two sequels, the last of which could only be found on the Amiga.

Lemmings (1991)

If there was a single game that could represent the Amiga experience, it would have to be Lemmings. Released by Psygnosis in 1991, it was quirky, fun, and addictive. Players controlled a large number of colorfully-clad, green-haired lemmings, who needed help getting from the start to the end of each level.

Without the user's assistance, the poor lemmings would usually walk straight off a cliff to their doom. Fortunately, the player could, with a click of the mouse, give certain key lemmings specific "jobs". One important job was the "halt" lemming, who stood with hands outstretched and flicked his head back and forth, causing any lemmings to reverse their direction when they ran into him.

An umbrella-wielding lemming would sail softly down to the ground instead of falling to his death. There was even a suicidal lemming option, who would count down from five to zero, squeak "Oh no!" and then explode. Sometimes this sacrifice was necessary, other times it was just fun.

Other lemmings could be tasked as diggers, or to build ramps to help the rest of the group reach inaccessible locations. Having all these options would make completing any level a trivial exercise, but there was a catch: each level gave the player a limited number of jobs to hand out, and not all jobs were available on all levels. If the user got really frustrated, there was always the "nuclear" option: setting all lemmings to count down from five all at once. The resulting chorus of "oh no"s and subsequent total destruction was strangely cathartic.

Lemmings by Psygnosis

Lemmings was incredibly popular, and the game became a symbol of sorts for the Amiga community. Gail Wellington, the director of Commodore Advanced Technical Support (CATS), once arranged for a whole group of Commodore employees to dress up as lemmings for a trade show.

They had the whole thing covered: the purple outfits, the green hair, the appropriate stances, an umbrella, and even balloons filled with confetti for the inevitable "Oh No!" finale. They worried a bit about this last part: what would the people who had to clean up think of such a stunt? It turned out that their fears were unfounded: the cleaning staff was more than happy to tidy up the mess after being so thoroughly entertained.

While Lemmings was ported to other platforms, most notably the IBM PC, the Amiga version had superior sound and even some game play options that weren't available anywhere else: two players could play at once with each using a mouse, thanks to the Amiga's unique ability to have two rodents connected at the same time.

Commodore employees dress up
Photo courtesy stevex.

In 2007, Sony released a new version of Lemmings to its PlayStation Portable (PSP) system. With multiple ports to choose from, they decided on the Amiga code base as the basis for the game. Now a whole new generation could experience the delights of pushing little green-haired creatures around.

Shadow of the 16-bit Beast

By Jeremy Reimer

Author's note: I want to personally thank the literally hundreds of people who replied to my call for stories from Amiga game developers, without whom this article would not have been possible. Unfortunately, it was not possible to include everyone's stories in the article, but I did make an honest attempt to reply to every email I received. If I missed you, I apologize.

Introduction

The Amiga was born a game machine, but it entered a world where the video game industry was well-established and changing rapidly. Long gone were the days where a lone coder would stay up all night in his basement for six weeks and bang out a hit for the Atari 2600. Even the younger and smaller computer game industry had moved far beyond Roberta Williams putting floppy disks into ziplock bags and answering phone calls from players in her kitchen. The success of the Commodore 64 (and on the other side of the pond, the Sinclair Spectrum) meant that more money was available for computer game development, and it was a good thing too, as the more powerful 16-bit machines were starting to seriously test the limits of a one-man development team.

For the first time, specialized careers were starting to emerge in game development. The Amiga's rich, 4096-color palette demanded people who were skilled artistically to create the sprites and backgrounds. The four-channel sampled sound chip cried out for musicians to make it sing. The larger size and complexity of the games required that someone other than the programmers be asked to test the games before they were released. Finally, new management positions were needed to oversee the work of these creative people.

Life in the trenches

Finding these people wasn't easy. In many cases it was a matter of people fresh out of their teens hiring their peers, people they knew from high school or from computer clubs. Some of the larger development firms, like Ocean, had a stable of in-house developers, but for most games the work was contracted out to a third-party team. These teams, often staffed with green developers, were dangerously unstable. Most teams never made it past their second game. Clashing egos and arguments, fights over poorly-worded or non-existent contracts, and disappearing funds would stretch friendships to the breaking point. When a studio was in desperate need of cash, developers and artists would work 16-hour days and beyond. Managers would call up contract workers at 2 AM to make sure they were still working. Miha Rinne, who worked at Terramarque, told me how his supervisor demanded that he write down all the time he spent writing notes, doing backups, and even going to the washroom! He later took his experiences in the game industry and made a comic out of it, which can be found here.

HENKILÖSTÖPÄÄLLIKÖN LUONA
YOU SAID WHAT?!?
I SAID, I MUST HAVE SOME ADVANCE PAYMENT, OR I CAN'T COME TO WORK!
SO YOU SAY WE GOT TO PAY YOU NOW, OR YOU WON'T WORK? I DON'T LIKE TO BE THREATENED!
!
=ARRGH= IT WAS NOT A THREAT KÖHHH!!
KÖHH! KÖHH!
LOOK, WHAT HE MEANT WAS THAT HE HAS SO LITTLE MONEY, THAT HE CAN'T AFFORD THE TRAIN TICKET.
KÖHH =VITTU= KRÖHH

The glamor of game development

Despite the long hours and low pay, there were still plenty of people eager to jump into Amiga game development, and many who considered themselves lucky when they got to be part of it. As Daniel Filner, who ported classic LucasArts titles like LOOM and Indiana Jones to the Amiga, told me, "At 17 or 18 my 'dream job' list was something like this: 1) Superhero, 2) X-Wing pilot or any other kind of astronaut, 3) Video game programmer.

"Then as now, there was a split between development groups and publishing houses, and the two parties' goals were not always compatible.

Publishers wanted to maximize revenue, so many games were released on "all formats", the Amiga, Atari ST, a stripped-down version for the IBM PC, and even versions for older 8-bit computers like the Commodore 64 and Sinclair Spectrum.

The requirement to make games hit the lowest common denominator held back developers who wanted to unleash the Amiga's full power.

Some development companies, like Psygnosis, went the other way. They concentrated on the 16-bit machines and went for as much graphical impact as they could. This strategy proved to be a success, as the owners of older machines now had a compelling reason to upgrade. As the 1980s passed, other companies followed suit. The Amiga became the showcase machine for games that pushed through the boundaries of what was considered possible. This in turn attracted exceptional people, like artist Jim Sachs, who were drawn to the idea of doing something new.

"I really enjoyed those early Amiga days," Jim said. "I couldn't wait to get up in the morning, knowing that I'd be creating brand-new effects which no one had ever seen on a computer screen before."

Even though the computer game scene was, then as now, much smaller than the market for home video game consoles, it had an effect on the larger world. Michael Crick, author of the game WordZap, recalled a story where the then-CEO of Nintendo (whose daughter was friends with Michael's daughter) walked in on Michael playing Defender of the Crown on his Amiga. The Nintendo chief, whose company was at the time bestriding the video game world like a colossus, could do nothing but stare, dumbstruck, at the machine while muttering "great graphics" over and over.

Jim Sachs' artwork for Defender of the Crown

Magazines and reviewers

Out of this industry grew a community. New and established gaming magazines became the focal point, bringing together the game developers, their games, and their users. Tom Malcom spent six years reviewing Amiga games for .info, one of the most popular magazines of the time. "If there was an Amiga game, I probably saw it and played it," Tom said.
"Every day, the UPS truck, always referred to as the Toy Truck, would pull up to the back door and drop off another load of games." On some days, over a dozen new titles would arrive.

The relationship between magazine reviewers and the developers was friendly and close. It was a more innocent time, before the days of pushy PR firms and pressure on reviewers to deliver "appropriate" scores. Tom would often visit the Psygnosis offices. His favorite game was an obscure side-scrolling shooter called Menace, and the developers told him a cheat code: "xr4titurbonutterbastard". This code was based on the car and driving habits of one of the developers, whom the rest of the team was afraid to ride with. Later, at a trade show in Chicago, he took some of the Psygnosis developers for a drive in his convertible as a way of returning the favor.

In October of 1989, Tom was scheduled to go to California to make the rounds of the game publishers. Three days before he left, the Loma Prieta earthquake hit. "The ceilings of SFO were in piles on the floor, the Marina district was still on fire, the Bay Bridge had a collapsed section, and the freeway in Oakland was pancaked," he told me, recalling the surreal experience. "I visited Electronic Arts in Redwood City, where David Dempsey, one of EA's marketing people, showed me the large cracks in their stairwells. People were a little skittish, but trying hard to carry on. I'd been kind of nervous about intruding on people so soon after the quake, but all of them seemed glad to have the distraction." Not even the collapse of the world was enough to stop these game developers from their work.

Once the games were developed and reviewed for the gaming magazines, the next step in the journey to the customer was the retail store. In those days, most places that sold computer games were independent businesses, each with its own layout and personality. Kevin Hollingshead ran a branch of the Program Store, which was one of the first of these places to become a chain.

They sold games for the Amiga and Atari ST as well as other platforms. One afternoon, Trip Hawkins (the founder of Electronic Arts) showed up in his store, after his records showed that the branch was selling more EA games than any other retail outlet. Trip told Kevin about his favorite games, as well as his master plan to make the Amiga a larger success and justify all the investment and enthusiasm that he had personally put into the platform. He had arranged tentative agreements from Japanese companies to make game consoles based on the Amiga chipset, as well as an "Amiga-on-a-card" for the IBM PC.

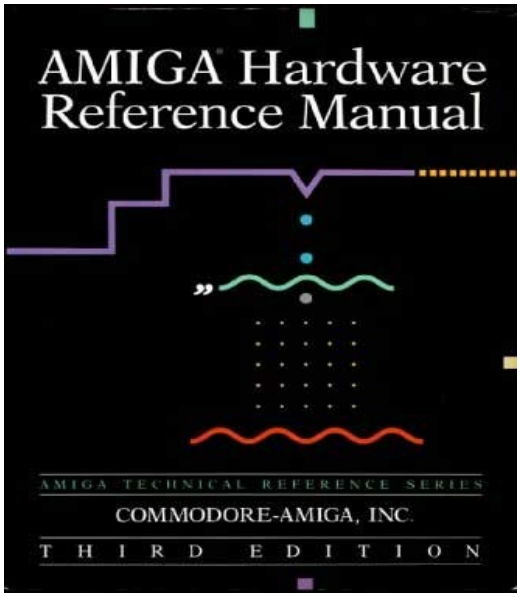
It's difficult to predict what would have happened to the Amiga game scene had these plans become reality, but in the end it didn't matter as Commodore shot down both ideas.

Still, the Amiga game industry thrived as the 1980s turned into the 1990s. As developers learned more and more about the platform, the Amiga began to be known as the computer with the best games. Publishers would often put the Amiga screenshots on the back of the retail game box, even on the Atari, Commodore 64, and IBM PC releases, with the text "Amiga version shown" in tiny print below.

Uncovering the mysteries of game development

The tips and techniques required to make great Amiga games were not taught in any schools. Developers often started playing with the built-in BASIC on computers like the Commodore 64 and moved on to playing with assembly language. By the time the Amiga was released, magazines such as Commodore Gazette and MC MicroComputer contained articles that delved into the innards of the hardware.

Still, to really understand the power of the Amiga's chipset, there was only one reference guide that really mattered: Commodore's own Amiga Hardware Reference Manual. This was the Bible for Amiga game developers. It let dedicated explorers discover how the Blitter chip blasted graphics directly from memory to the screen, how the Copper let the programmer jump in and change the way the display worked even in the middle of scanning a line on the screen, how the audio chip offloaded sound processing, and how the CPU synchronized all these activities together.



The Holy Bible

The first thing developers would typically do when starting to write a game was to gently cut off the operating system in order to gain complete control of the hardware, including memory. This was done to save memory and so that games could squeeze every last amount of power from the custom chips. When the game ran, however, the developer was running without a safety net.

There was no integrated development environment or debugger that could execute at this point. Clever developers would use the hardware itself as a monitor, sending signals to the Copper to change the background color at key points in the program.

When things went wrong, they went wrong spectacularly. There was no memory protection, so if one part of the program started to overwrite another, the screen could erupt in random fireworks before the system locked up. The only way to make sure the whole thing would work was to build and test specific routines for each small component of the game before starting on another.

Amiga game developers used many different tools in their work. To save on development time, many used high-level languages, mostly C. Popular compilers were Lattice C from SAS, Manx C, and DICE. Still, for raw speed and power, you couldn't beat 68000 Assembly language. On early Amigas, memory was at a premium: the market consisted of machines like the Amiga 500 with 512 KB (that's kilobytes, not megabytes!) of RAM, split between "chip" (memory dedicated to the display and custom chips) and "fast" RAM. Getting everything to work smoothly, without flickering and at high frame rates, took a lot of mental juggling.

Consider the task of Cesare Di Mauro, developer of USA Racing. He wanted a target of 50 frames per second to retain a smooth experience, but this, combined with RAM constraints, meant that it was impossible to use double-buffering (a technique where a second screen with the next frame of action is stored behind the scenes in memory). Using a single screen saved execution time and memory, but made the task of scrolling the background and updating the BOBs (blitter objects, similar to sprites) much more difficult.

His solution consisted of a 352 x 272 virtual screen, with only 320 x 240 pixels viewable at any time. The area was divided into two vertical slices, combined to show a single view. The background consisted of 32 x 32 pixel tiles, arranged in a large map of 4096 x 65536 pixels (coders everywhere will recognize those numbers).

Juggling the number of tiles, the BOBs displayed on top, the music and sound effects, and collision detection with walls and other cars was a huge challenge. Cesare ended up writing a tool in assembly language that handled all of these at 50 frames per second, sorting drawable objects into a display list to maximize performance.

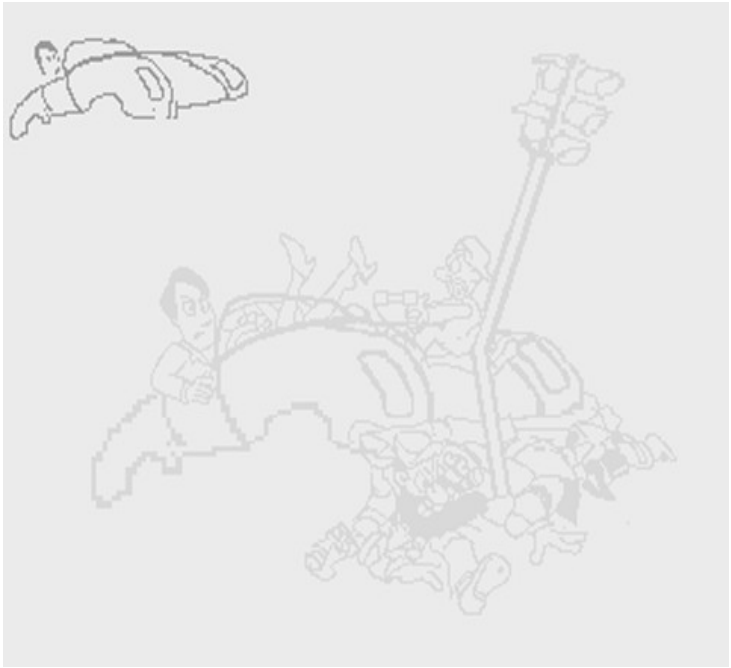
The program would first display all BOBs in-order on the list, then update hidden areas to handle scrolling (horizontal scrolling was handled by the graphics chipset by setting a scroll register value, while vertical scrolling was similar but more complicated), then waited for the monitor's display beam to reach the bottom position of each BOB to restore the background they had "stained." He wrote custom routines for sound and even disk access to maximize speed and minimize RAM usage.

This sort of careful balancing was typical of game programmers who wanted to push the envelope. Many of the concepts they came up with would be recreated as part of industry standard libraries much later, display lists, for example, are a crucial element of Direct3D.

Painting the canvas

Dedicated graphic artists were no less innovative. Deluxe Paint from Electronic Arts was the premiere drawing program at the time, but it did not have many of the features (such as layers and history) that Photoshop would later make standard. Graphics tablets and scanners were expensive back then, so many artists had to improvise.

Miha Rinne worked on many images for Amiga games. In the following example, he had to make a background image for a driving game. Time was always of the essence. A typical workflow would start with Miha drawing an outline sketch, done at 2x zoom with the mouse, using the lightest gradient.



He finished the outline in a darker shade. Once he was confident about how the image looked, he could move on to the next stage: coloring.

To save memory, 32 or even 16 color modes were commonly used. This made it extremely important to choose the right color palette. This picture was the artist's first 256-color image.

The next stage involved adding shading and smoothing the edges. Miha did this by hand, pixel-by-pixel. Slowly the original outline was erased.

The final image. This was the last piece of artwork that Miha ever did for the company he was working for at the time.

Sometimes a simple effect could make all the difference in a game. Christopher Jackson, a developer for the Amiga version of Wayne Gretzky Hockey 3, added an animation of a hockey player shooting the puck towards the player and appearing to "shatter" the monitor as it went through. Then there were the little touches: adding tiny trails of pixels behind the players that the Zamboni could later scrape off.

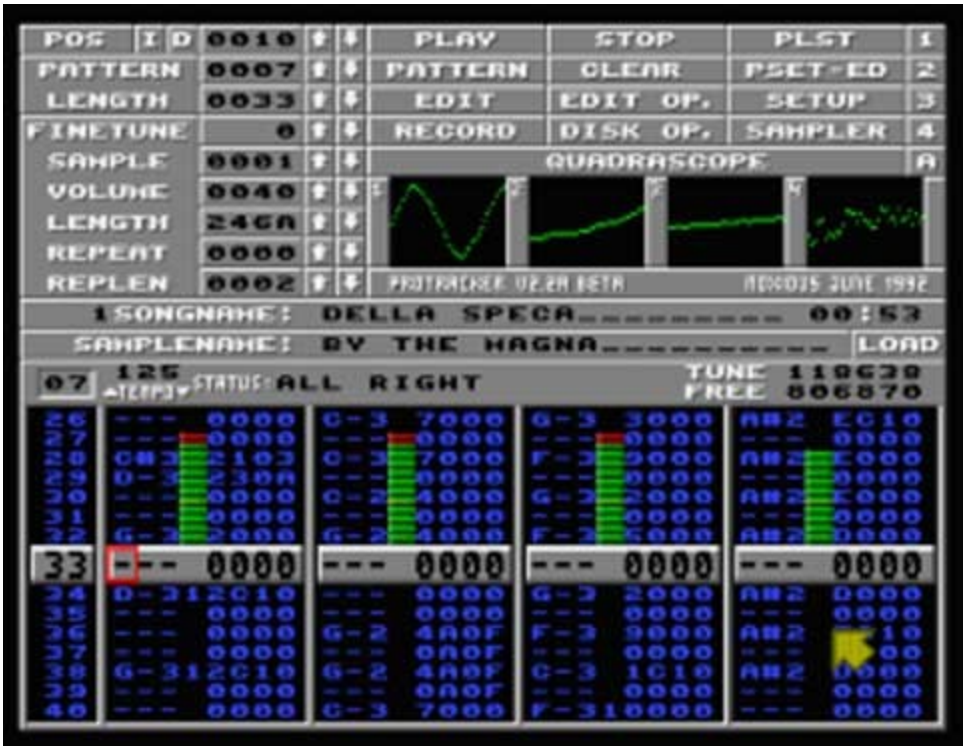
Unsurprisingly, the other versions of Wayne Gretzky Hockey had the "Amiga version shown" screenshots on the back of the box.

Many game artists who moved to the Amiga felt an amazing sense of freedom that they hadn't experienced before. Manfred Kramer, who later became a computer graphics artist for video games and movies (and most recently worked on Avatar), wrote: "I was using a C64 for doing pixel graphics, so you can imagine how it felt the first time I had a real color palette and a mouse! I remember exactly how it felt when I moved the mouse and added yellow color to the screen in realtime. I also remember also that I had tears in my eyes when I saw my first 3D rendering show up on my newly purchased framebuffer for the Amiga 2000."

Bringing the noise

No less important than writing the code or creating the graphics was completing the soundtrack. Even graphically stunning games like Shadow of the Beast were known for their hauntingly evocative music. No longer confined to beeps and bursts of static, the Amiga musicians could play with four channels of sampled stereo sound.

Amiga music files, called MODs, stored samples of each instrument along with information about the duration, intensity, and special effects applied to each note. These files were created with programs called sequencers, which ranged from freeware applications like Noisetracker and Protracker all the way up to custom-coded sequencers.



Protracker screenshot

Creating music for Amiga games was usually a rapid effort, and musicians were often brought in near the end of a project for at most a couple of weeks. Matt Simmonds once had to work over a weekend because two games needed their soundtrack by the following Monday. He wrote about 30 songs over two days, a level of productivity not often seen even today.

Never giving up

Creative programming techniques, brand new graphic effects, and innovative music were all par for the course for Amiga game developers. But who were these people? What drove them? Jim Sachs had an answer: "...Even in those days, it was not really about the hardware. It was about the type of people that were attracted to it, their "can-do" attitude. When I started consulting on PC projects after the Amiga, I was surprised that developers were not eager to try something unless some other developer had already done it. With the Amiga developers, it was almost pointless to try for an effect unless NOBODY had done it before."

These types of people existed all over the world, some of them in very trying circumstances. Rabah Shihab was a student at Baghdad University in Iraq during the early 1990s.
Together with his artist friend Murtadha Salman and musician Mahir AlSalman, they developed an Amiga game called Babylonian Twins. The game was developed on an Amiga 500 computer with only 512 KB of RAM, and had impressive graphics inspired from history texts. While the game was virtually finished, the first Gulf War and the subsequent sanctions on Iraq made publishing the game impossible.

Rabah didn't give up, however. Decades later, now living in Canada, he salvaged the assets of the game and reunited his old team to finish the product. A demo version of the original Amiga code was finally released to the public, with the full release to follow. However, there is another gaming platform that has just arrived on the scene, one where small groups of independent developers can still compete with giant companies. An enhanced version of Babylonian Twins has recently shipped for the iPhone and in an HD version for the iPad. I've played the game, and it is an engaging side-scrolling action puzzler, sort of like Prince of Persia meets The Lost Vikings. It has already won several awards. You can get it via the Apple store or from their website.

Babylonian Twins running on the iPhone